A Century of Carpet and Rug Making in America

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To the Memory of

ERASTUS BRIGHAM BIGELOW

WHOSE VISION AND INVENTIVE GENIUS
CONTRIBUTED SO HEAVILY TO THE EARLY HISTORY
OF THIS COMPANY, AND, INDEED,
REVOLUTIONIZED THE CARPET MAKING
INDUSTRIES OF THE WORLD,

this volume is

Respectfully Dedicated.

2777180

THIS volume, "A Century of Carpet and Rug Making in America," has been prepared and published in commemoration of the hundredth anniversary of the founding of the Bigelow-Hartford Carpet Company, and is presented with the compliments of the Company to the customers and other friends whose patronage and loyalty have made possible the business development recounted within its pages.

In it we hope that you will find more than biographical mention of the milestones that have marked the progress of this Company. It has been our purpose to set forth the important facts which have cast their influence upon American industry during the last century—particularly those affecting the carpet industry.

In our quest for information not contained in our own records, we have found authorities sometimes at disagreement, and hence have had to draw those conclusions which seem to us most logical with reference to the entire survey. In this connection, we would express our grateful appreciation for the suggestions and other assistance given by our many friends incident to the preparation of this publication.

This book has been edited by Mr. Alexander N. Cook, our Advertising Manager, who was connected for many years with the Lowell Manufacturing Company and the Bigelow Carpet Company.

BIGELOW-HARTFORD CARPET COMPANY

NEW YORK CITY
APRIL 1, 1925

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JOHN F. NORMAN
President
Bigelow-Hartford Carpet Company

PROLOGUE

"Although we have every reason to believe that the art of carpet weaving dates back to the beginning of history, there is probably no industry about which we know less bibliographically, and the paucity of reference is more extraordinary, as it is not confined to the works of remote ages, but is continued in our own time."—Sir C. Purdon Clarke, late Director of the Metropolitan Museum, New York City.

SOMEWHERE in that strange land of antiquity whose long-slumbering secrets challenge the curiosity of archeologists, somewhere in that little-known realm peopled by the ancestors of our oldest races, is to be found the beginning of one of the world's most romantic arts, an art that even in its rudest forms was sumptuary, an art that was coeval with the first exaltation of one man above his fellows. And that is the art of carpet making.

As old, as hallowed with romance, as often sung in ancient poetry as the potter's wheel, is the carpet loom of the East. In myth, in history, in prose and poetry are to be found references to carpets. Ancient records describe the coffers and treasure chests of emperors filled with hangings and rich cloths, embroidered coverings set with jewels, and finely woven tapestries.

The Babylonians were skilful carpet weavers, according to Pliny, and the art was practiced by the Assyrians, the Medes, and the Persians, as well as in India, in China, and among Arab races. The names of classic authors who often mentioned the beauties of carpets are legion: the Biblical writers, Homer, Æschylus, Josephus, Arrian, Athenæus, Plautus, Metellus, Scipio, Horace, Pliny, Lucan, and old Khayyam. Myth tells of Cleopatra, ancient serpent of the Nile, who wrapped

herself in a carpet to insure her safe delivery to Cæsar; and Sheba laid rare rugs before King Solomon.

Hieroglyphic representations of carpets and weavers have been found in Egypt, where began the world's first known civilization, yet many designs always present in Turkish and Persian carpets, even down to modern examples, can be found in the carvings of the temples of Yucatan, temples that were constructed when Egypt was an undiscovered waste-land, and Babylon a wooded spot between two rivers. With the exception of the myths and the more enduring representations in stone on the rock-cut tombs of Beni Hasan, and a few frail fragments of tapestry occasionally unearthed from Egyptian ruins, the first widespread knowledge of the carpet came from the East—from Persia, from India, and from Turkey.

The organized manufacture of Oriental carpets is a comparatively new phase of the industry. For centuries they were woven in the homes by domestic labor. The women of the tribes gathered around the looms while the head woman made a rough design upon the ground and apportioned the wool, sometimes chanting in weird singsong the number and the color of the stitches. It was the task of the men to make the dyes, to gather alizarin roots, seeds, herbs, nuts, and berries, from which natural sources literally thousands of shades of one color could be derived. With these simple materials they produced rare shades ranging from the poignant red of spilt wine to the delicate pink of a faded rose, from the pastel green of the spring's first birch tree to the living green of the laurel leaf—colors which we know not in our day, like the undiscovered purple made from Mediterranean shellfish, which was probably a glowing crimson, and was the chosen color of royalty.

The earliest known carpets of the Orient possessed a flat surface, rather than the velvety face of the cut- or loop-pile. Such were the carpets of Soumaki*, a no longer existing Khanate west of Shirvan.

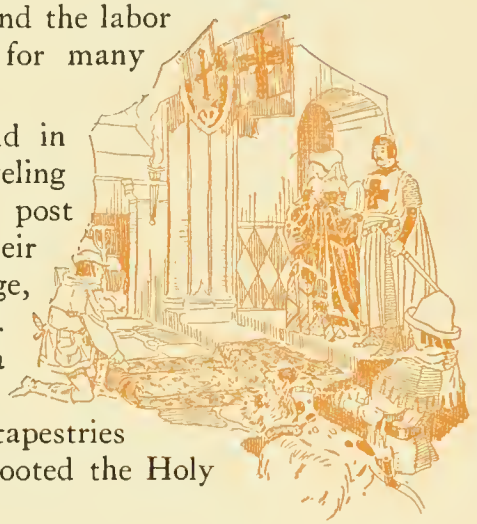
These carpets were of stoutly woven flax or hemp, ornamented with close needle stitches of colored threads. The type of needlework on these ancient carpets is of the same variety as, though

*Authorities have long considered the word Soumaki a corruption of Shemakha, a hill city in eastern Caucasia, but it is now known that there was a city by that name before it was driven out of existence through a political redivision of the country by the Russians.

naturally coarser than, that used on the valuable and famous Kashmir shawls.

The art of carpet making was widespread in the eastern countries in the 4th century, B. C., and the conquests of Alexander the Great, extending as far as India, brought the Greeks closely in contact with the industry. Examples of the art had been previously known to the Greeks, however, for Themistocles is quoted as having likened an eloquent man's discourse to a "rich Persian carpet, the beautiful figures and patterns of which can be shown only by spreading and extending it out; when it is contracted and folded up, they are obscured and lost."

The Roman conquest of the world, with its looting and subsequent garnering into Rome of all priceless arts, further introduced carpets into Europe. When, in the 15th century, the Turks conquered Constantinople, many artificers fled to Italy, establishing their industries at Venice, Genoa, and Florence, and a few towns of southern France. From these centers the knowledge of carpets spread over Central Europe, but the workmen were so few and the labor was so great that carpets remained rarities for many generations.



Undoubtedly the Crusaders brought England in touch with the carpets of the Orient, for a traveling man is a traveling man, and in lieu of picture post cards, the knights of old brought home to their "ladyes faire" gifts and souvenirs of those strange, foreign lands, and among them were rich carpets. These served as an inspiration and, no doubt, a source of envy to sweethearts, wives, and daughters who had stayed behind nimbly embroidering tapestries of pink horses and green dogs while their men looted the Holy Land in a noble cause.

Following the Hegira from Africa, the Moors had settled (not peacefully, to be sure) in Spain, bringing with them all the stored-up knowledge of carpet weaving gathered in a nomad life. Spain, unwilling to accept her unbidden guests, was, nevertheless, anxious to acquire the strange, ingenious carpets which the Moors made, and to

imitate them. Only recently have examples of Spanish carpets been obtained for public collections, and at present the information concerning the manner of their manufacture is exceedingly scant.

It is known, however, that the first public and dated appearance of carpets in England was due to Spain, for in 1255, Edward I was married to Eleanor of Castile at the Cistercian Convent of Las Huelgas, near Burgos. Her half brother, the Archbishop of Toledo, preceded the ten-year-old princess to England in order to prepare the way for her reception. She arrived with "a great retinue, but a scanty wardrobe," to find that her brother had had her apartment at Westminster magnificently hung with costly tapestry "like a church; and carpeted after the Spanish fashion." This was the first time that tapestries and carpets had been seen in England except as articles of adornment for altars. The fabrics of the high church were used to decorate the rooms of a Spanish princess! Beautiful carpets, such as were used only rarely in ecclesiastic pageants of the highest order, were spread beneath the feet of a ten-year-old foreigner! Dame England (and her husband, too!) gossiped maliciously, until so uncomfortable an atmosphere was created that the child princess was glad to go into retirement "to complete her education."

Marco Polo, voyageur and connoisseur *par excellence* in the 14th century, cites the carpets of Turcomania as "the handsomest carpets in the world," and it is the fabrics of Komeh and Cæsarea in Anatolia and Sivas in Asia Minor rather than of Persia that appear to have been the first Oriental carpets known in Europe. Persia, however, soon supplanted these towns in European favor, and Turkey followed.

In spite of the growing interest of Europe in the art, Persia and Turkey remained the centers of the industry for centuries. England and France admired and coveted, Persia and Turkey manufactured, and Italy received the middleman's profit. The choicest of specimens in museums and private collections are Persian of the 15th and 16th centuries, such as the Ardebil carpet, the Abdul Aziz carpet in the Marquand collection, and the Lobanow Rastowsky carpet. As early as the reign of Henry VIII we have records of purchases of carpets by Cardinal Wolsey through the Venetian Ambassador, and it was

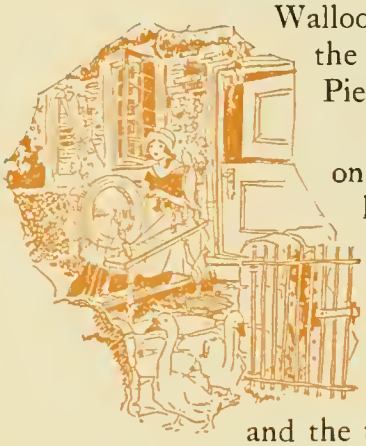
in that reign that Richard Sheldon lent his home to a weaver named Hicks who produced among other carpets woven maps of Worcestershire and Oxfordshire, specimens of which are still in existence.

In France, in 1604, a workroom was established in the state manufactory at the Louvre (Manufacture Royale des Meubles de la Couronne) to make Oriental carpets. In 1610 letters patent were granted to Sieur Fortier, reputed to be "the first inventor in France of the art of making silk and wool real Turkey and other piled carpets with grounds of gold thread." Ten years later Pierre Dupont and Simon Lourdet started a pile carpet factory at Chaillot, near Paris, in what had been a soap factory. From *savon*, the French word for soap, came the name "Savonnerie" which has been extended to cover a type of carpet. In 1631 the carpet makers from the Louvre were transported to Chaillot and it was not until 1828 that the Savonnerie took its place at the Gobelins. During the reign of Louis XIV, Colbert established weaving guilds at Beauvais under the shadow of the great unfinished Cathedral; their carpets, like those of the Gobelins, were *tapis ras*, or non-piled carpets, while those of the Savonnerie were piled carpets of a fine velvety character.

The Revocation of the Edict of Nantes in 1685 deprived the Protestants of their religious protection and caused many weavers to flee to Germany and England. These men took with them the knowledge of weaving learned in the great French centers and gave a decided impetus to the experimental work which had been going on in a rather desultory way in England for some years.

These French and Walloon artisans carried on their manufacture of "Turkish" pile carpets, and as early as 1701 English weavers in Axminster and Wilton were granted a protective charter by William III. Both of these towns have given their names to distinctive fabrics now made in many countries; Axminster no longer manufactures carpets, and other towns such as Fulham, Moorfields, Exeter, and Frome, where early attempts were made to establish the industry, are no longer identified with carpet weaving.

Wilton, still a great center for the manufacture of Wiltons, Saxonies, and Axminsters, was greatly aided in its industry by the interest taken by Henry, Earl of Pembroke and Montgomery, who, while traveling on the continent, drew together a band of French and Walloon craftsmen and established them in that town under the direction of two Frenchmen, Antoine Dufossy and Pierre Jemale.



It is an old legend that owing to the natural reticence on the part of France toward English proselyting among her expert weavers, it was necessary to smuggle Dufossy into the country in a sugar cask. Almost dead from suffocation and so cramped that he was unable to walk for days, the expatriate would have returned at once were it not for the fact that to do so necessitated his disguising himself as a bale of wool. He remained, and the two artisans first produced Brussels or loop-pile carpeting, but later the cut-pile Wilton was developed, taking its name from that of the town.

About 1736 the weaving of carpets seems to have been established at Kidderminster, where for years had been woven broadcloth and the popular "flowered stuff" beloved of ladies of quality and milkmaid alike. The so-called "Scotch" or "Kidderminster" carpets were made on the old hand loom after the cottage system. There was, at that time, no organized factory; instead, the wool was allotted to various households in which one or more members tended the looms while the rest of the family did the domestic chores and the farming. The master of the house could be found at the loom, while one of his daughters, sitting at the wheel, spun the weft, and the good wife, as she scrubbed, and scoured, and prepared the midday meal, sang above the clack of the weaver's shuttle.

After the carpets were completed they were gathered up by the "master manufacturer" for wholesale and retail trade. Many were exported to America as articles of luxury.

It is of this type of life that the poets love to sing, but it is doubtful if the vision of "contentment spinning at the cottage door" was realized in those days of labor from dawn to dark, when the custom-

ary method of payment was in wools and supplies with which to weave more carpets for the "master."

About the middle of the 18th century there came to England from France a "distinguished anti-Jesuit—the renowned Father Norbert," who became naturalized, taking the name of Mr. Peter Parisot. He found that two refugee French carpet weavers, deserters from the Savonnerie, had begun work on a specimen carpet, weaving in a hidden little room in Westminster. Parisot had some influence with the Duke of Cumberland, and induced him to furnish protection and funds to allow them better workrooms at Paddington. The carpet, when completed, was presented by the Duke to the Prince of Wales, and, jealous, perhaps, that his protégés should surpass him in his own art, Parisot quarreled with the workmen and, enticing others to come over from France, moved the carpet works from Paddington to Fulham. Here he established also a training school in the craft, imparting to English workmen secrets and methods learned in France.

Parisot's Fulham works were sold in 1755, and he attempted to start a factory at Exeter, apparently without success, for in the following year his stock was sold in the Great Piazza auction rooms, Covent Garden. A man named Passavant, a wealthy serge-maker of Swiss nationality, bought the Exeter works and in 1758 was awarded the premium from the Society of Arts for the best imitation of Turkish carpets. Other awards are noted in other years, going to manufacturers in London, Axminster, and Frome, and in 1783 in the *Transactions of the Society* (of Arts), Volume 1, it is stated that the manufacture of "Turkish carpets is now established in different parts of the Kingdom and brought to a degree of elegance and beauty which Turkey carpets never attained." Records such as these convey a notion of the sporadic attempts which immediately preceded a systematic manufacture of pile carpets in England. The process was slow and laborious, requiring a man and a boy at each loom, and the price demanded by the retailer was correspondingly high. But carpets in the 18th century were essentially luxuries; the staple floor coverings in England and the American colonies were still rushes and sand, and it was only after years of research, experiment, and invention that American genius was to enable every home, whether

rich or poor, to afford the quondam luxuries of princes and the High Church.

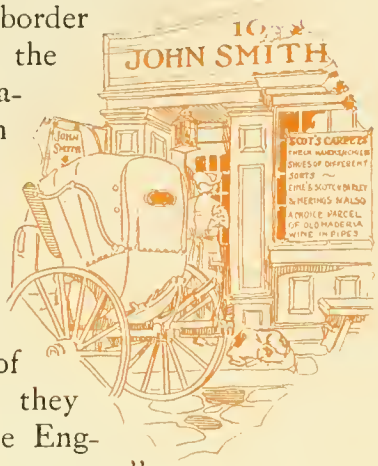
The art of weaving carpets had its inception in the American colonies at a date considerably later than in England, but the development was so rapid that it soon became an industry of sufficient importance to encourage American talent to inventions that were to revolutionize the manufacture of carpets the world over.

Early in the 18th century, carpets were extremely rare in the colonies, being in the houses of the few very wealthy men in the country. In many homes the old Dutch custom of strewing sand upon the floors was practiced by the housewives, for this possessed the double quality of silencing the footsteps and of polishing the rough boards. The woman with leanings toward self-expression often arranged the sand in designs upon the floor, a scheme that without doubt prevented many a family dispute, for were the artistic values questioned by the family (as such attempts by an individual often are disputed by relatives) it was a simple matter to rearrange the floor covering until its merits were acknowledged by all.

At the time of the Revolution, however, woven carpeting was more generally known, and an old diary tells of a parson's living-room which was carpeted in heavy homespun of woolen yarn, in a pattern of broad, lengthwise stripes. The surface was smooth and easy to keep clean, and the thick woolen threads made the carpet extremely serviceable. The colors of the colonial rugs of this sort were not particularly attractive, the reds and blues being satisfactorily rich and clear, but the purples and greens being dingy and the yellows muddy. Records show that these rugs were seldom made at home, which leads to the conclusion that professional or semi-professional carpet weavers were to be found in some towns of revolutionary America.

Rag carpets, much the same as those now woven in Cape Cod towns, were the niceties of the middle class, and the rare carpets of the wealthy were ordered privately from Europe. Certain "lords of the manor," a few decades before the Revolutionary War, had by

diligence and thrift become moderately wealthy and sent from time to time to Europe for certain luxurious articles not to be found in the colonies, inlaid cabinets of tortoise and silver gilt, damask hangings, and pieces of "Broussells carpett." One account book kept by the wife of a colonial judge records the purchase, along with other rare objects, of "36 yards of Broussells carpett with border —£36." Even though this amount probably covered the transportation costs, it is easy to see why the importation of a carpet was of sufficient interest to be put on record along with the details of a strange murder and the birth of a two-headed calf at New Town.



In 1760 a very progressive store in New York advertised "Scot's carpets" along with "check handkerchiefs, shoes of different sorts, Eine's Scotch Barley and herrings," and "also a choice parcel of old Madeira wine in pipes." The following year they offered Turkey carpets, and two years later, "some English and Scot's carpets and hair cloth for stairs and passages."

So the importance of carpets grew, but it was not until after the War of the Revolution that the manufacture was established in America. In 1791 William Peter Sprague began to make Axminsters in Philadelphia. One of the first designs was a representation of the coat of arms of the new republic. From an artistic standpoint it probably was not significant, but it achieved fame, not only as the first attempt made in this country, but as the first article to which Alexander Hamilton applied the principle of a protective tariff.

In 1800 Joseph Marie Jacquard of Lyons, France, invented a system of selecting and raising the threads required to form the pattern in silk materials, a principle that was soon applied to carpet weaving. This was by means of a perforated cardboard not unlike the music roll of the player piano; the blank—or it could be the perforation—caused the harness carrying a certain thread or set of threads to rise.

Probably the first Ingrain carpet mill in the United States was that of George Conradt, who came to this country at the beginning of the 18th century from Wurttemberg, settling in Frederick County,

Maryland. The carpets were made by hand loom on a drum studded with pegs, giving it the appearance of an enlarged, old-fashioned music box. The factory was a stone building, and at the beginning of a new century was still standing, one of the picturesque ruins to be unexpectedly encountered on rambles and fishing trips, one of the forlorn old architectural veterans, rather pitiful in their present ineptitude, left behind in now deserted bits of countryside by ambitious Industry on its ceaseless march toward modern and more notable achievement.

Chapter One

The INCEPTION *of a* GREAT INDUSTRY

THOUSANDS of years lie behind the carpet industry. When and where the first carpet was made is a question which the archeologists and historians have not yet been able to answer. They are only able to say that the first *known* carpets *probably* were made in Egypt. From those uncertain years the growth of carpet making can be traced clearly through Turkey and Persia and India, and, later, the towns of the continent and England, down to the present day when America is the country preëminent in the modern phases of the industry.

The last one hundred years have wrought great changes in the carpet industry, and America has been responsible for a large proportion of those changes. Throughout that century of shifting history and of industrial revolutions, a vast concern was growing. This concern, the Bigelow-Hartford Carpet Company, began with four distinct sources which grew and united until now, a hundred years after the establishment of the first small mill, it is one of the foremost companies in the industry.

Alexander Wright's Ingrain Carpet Mill

In the little town of Medway, Massachusetts — a town imbued with that atmosphere of rigid principles, keen imagination, hard honesty, and clear and vivid foresight characteristic of Colonial New

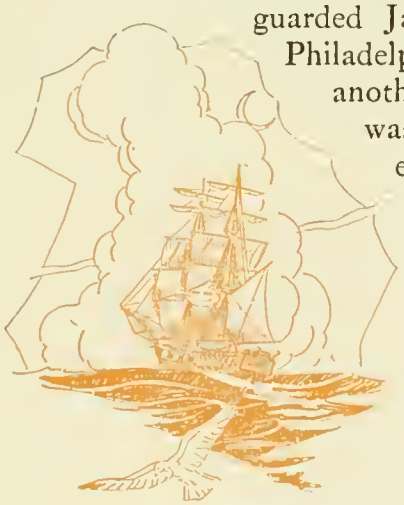
England—there were conceived in the year 1825 the modest beginnings of what was to be this truly great industry.

Many things happened that year in the new republic of the United States of America. The Erie Canal was opened, linking the seaboard states with America's vast and wealthy hinterland by a continuous artery of transportation. John Quincy Adams was elected President of the United States, and in his first message to the public expressed himself in favor of national appropriations for internal improvements, urging the multiplication of canals, the endowment of a national university, expenditures for scientific research, and the erection of a national observatory.

And in 1825 there was started at Medway, in Norfolk County, Massachusetts, a small Ingrain carpet mill owned by Henry S. Burdett, but supervised and managed by Alexander Wright, a Scotchman, shrewd and imaginative.

Wright worked with hand looms brought from Scotland, precious old looms whose overseas trip was supervised with more solicitous care than he ever dreamed of expending on himself, looms that brought with them the traditions of the old world and embodied all the perfection that generations of weavers had been able to give an inanimate object.

With the same pioneer spirit that carried him to a new land in which to develop his dreams, Wright bent his efforts toward further perfection of the looms in his tiny mill. He learned that in Philadelphia Ingrains were being manufactured with that new invention, the Jacquard machine. When other methods of learning the closely-guarded Jacquard secret had failed, the canny Wright went to Philadelphia himself, seeking admission to the mill in one way or another. His exact approach is unknown, but whatever it was, as an interested layman, an expert weaver seeking employment, or, it may have been, as the administrator of carefully placed bribes, he was recognized and the mill doors were locked in his face.



Realizing that in the unseen Jacquard machines lay a principle important in the manufacture of carpets, Wright determined to learn the details of the new

invention, and with this as his purpose, he set out again on the long and dangerous voyage in a sailing vessel to Scotland. He visited the manufacturing centers, talking with the master mechanics and hobnobbing with the inventors and manufacturers of the day.

After a careful search, he bought the most modern looms to be found, and returning to America with them, he was accompanied by two expert mechanics, William and Claude Wilson, who were to aid him in the operation of the looms. Claude Wilson was particularly skilful and devised improvements in the Jacquard loom, simplifying its construction and rendering it more certain in its operation.

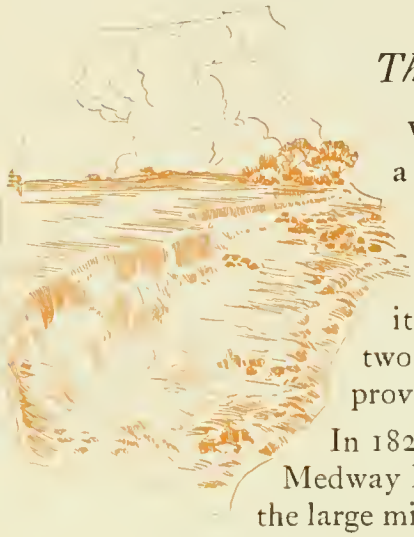
Wright found that experimental work such as he was attempting was often very discouraging, but the sudden success of various scientific endeavors after repeated failures encouraged him.

While Wright had been in England, George Stephenson had made his first practical demonstration of his steam locomotive. Crowds had gathered to see the failure of the "Iron Horse," and Wright, with the sympathy of a kindred experimentalist, had silently hoped for success. Derisive jeers soon changed to admiring cheers as George Stephenson brought his train safely into Darlington. And one spectator, the operator of the tiny mill at Medway, sailed shortly for America, fortified for his own task by the success of another pioneer who, though in a different field, had overridden discouragement and obstacles in making a dream come true.

For three years Wright experimented with his loom, turning out some production, to be sure, but more important still, contributing in a definite way toward the inception of the great industrial and business era of a later day.

Those early years of the 19th century stand forth with epochal importance in the industrial and scientific history of both England and America. Faraday was to find that benzine was a constituent of petroleum; Crowther was busy on a hydraulic crane; Thelford was experimenting with suspension bridges; Brunel was making models for a tunnel under the Thames; Herschel and Talbot were working

out spectrum analyses; McCormick was planning his reapers; and Jennings was experimenting with friction matches. And throughout America, men like Wright were laboring and experimenting in their more modest tasks of building foundations for industries that were some day to put America at the head of all nations as the greatest producer of manufactured goods in the world.



The Lowell Manufacturing Company

While these experiments were going on in Medway, a charter had been granted to the Lowell Manufacturing Company to manufacture cotton goods and carpeting at Lowell, Massachusetts. This city, the "Spindle City" or "Manchester" of America, with its abundance of water power furnished by a thirty-two-foot fall of the Merrimac River, had already proved its desirability as a manufacturing center.

In 1828 the Lowell Manufacturing Company bought the Medway Mills, continuing to run the looms at Medway until the large mill was completed, at which time the machinery was moved to Lowell. Alexander Wright, still shrewd and imaginative and Scotch, became the first agent for the Lowell company.

The enterprise continued to be considered an experiment at Lowell for some time, for there were many who believed that the demand for carpets would not justify paying for the skill necessary to make them. The hand looms of those days were by no means as perfect as the hand looms of the present day and the progress was slow. But the company persevered, and ultimately became one of the nation's best-known carpet mills.

The first product of this company was the "Lowell" Ingrain. In due course, however, the concern won an exceptional reputation for Wiltons and Brussels, and later still for Axminsters.

Many of our readers will recall the company's trade-mark—a hollow stick with the word "LOWELL" upon it. This had an interesting origin. In the manufacture of Ingrain carpet, the finished

goods were tightly rolled on a square or octagonal steel bar as they left the loom. When the required number of yards had gone into the roll, the bar had to be driven out before the carpet could be shipped. Removing the bar without telescoping the roll was next to impossible, and finally the Lowell mill conceived the idea of the hollow stick to surround the metal bar. The bar could be readily driven out of the wood without disturbing the roll, and the latter was always shipped with the hollow stick as a core. Not only were the goods thus automatically trade-marked, but the sticks themselves came to be a useful store fixture when the rolls had been sold out, as they proved exceedingly convenient as a means for rerolling carpet for the storekeeper's inventory. The idea of the hollow stick was patented, and led to not a few controversies between the Lowell Manufacturing Company and some competitors who thought it worthy of adoption without first enlightening themselves as to the legality of the procedure.

The Lowell Manufacturing Company was fortunate in securing in 1881, as treasurer, Arthur T. Lyman. His father, George W. Lyman, had been treasurer of the company from 1831 to 1841, when power loom experiments were beginning to show promise of real success (as will be recounted in a later chapter), and had given much encouragement and financial aid to Erastus B. Bigelow, the young inventor. Arthur T. Lyman took over the financial management of the company, therefore, with more than usual interest, and served until the union of the Lowell Manufacturing Company and the Bigelow Carpet Company in 1899.

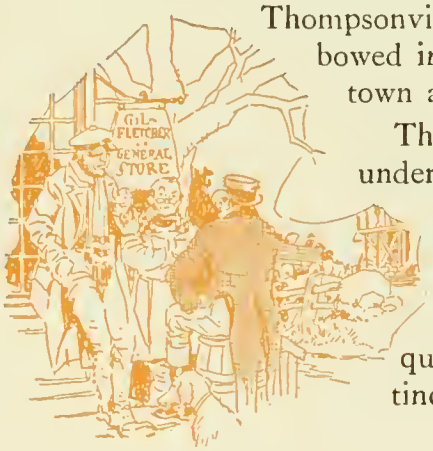
A man of scholarly attainments and broad business experience, Mr. Lyman was ideally fitted for the management of the company's affairs during these years preceding the dawn of the 20th century, when manufacturers had to be foresighted in their thought and sure-footed in their action, in order to keep abreast of the swift moving times. The success of the company under Mr. Lyman's guidance is a matter of history, and a permanent tribute to his personal ability.

The Hartford Manufacturing Company and the Hartford Carpet Company

In 1828, the same year that the Lowell Manufacturing Company absorbed the Medway Mills, Orrin Thompson was granted a charter to manufacture Ingrain carpets at Thompsonville, Conn., as The Hartford Manufacturing Company. Thompson, born in Suffield, had entered a mercantile life in Hartford as a boy, and at the age of forty had developed into an exceptionally capable business man, enterprising and foresighted. Of the company he founded, David Andrews was president, and Henry Thompson, the brother of the founder, was the agent.

The charter was granted by the May legislature and the erection of the buildings for the manufacture of such machinery as could not be imported consumed the remainder of the year.

It was a notable year for the inhabitants. Peaceful, sluggish little Thompsonville was to become an industrial town. "Mister Orrin" was building a mill; and the housewives found time in the marketing to give a glance at the "white mill" in the process of erection. The men stopped work to join the loungers for a moment in a discussion of the possibilities of the industry, and anxious mothers left their pies in the oven while they warned the children to keep off the scaffolding. The weave sheds were put on the north side of Main Street, on the twelve-acre square which is covered by the works of the present Bigelow-Hartford Company. It was a busy time for Thompsonville, and we can almost see the village loafer, bowed in gloom, prophesying that he would live to see the town an energetic industrial center.



The year 1828 was one of dissension in America, for under a protective tariff the North had grown rich and prosperous, but the South was crying for free trade. Northern manufacturers who had put large sums of money into their industries forced Congress to accept a high and comprehensive tariff, and the question, from being a national issue, became distinctly sectional.

Difficult years were to follow, for the Indians were causing trouble in Georgia and Florida, the Abolitionist movement was beginning in the North, and the South, by its insistence upon free trade and its habit of nullifying any laws which it did not approve, was provoking more and more the hostility of the government. This hostility came to a head during the winter of 1829-1830 in a debate on the sale of public lands. The topic was dragged in by Southern speakers. Webster upheld the cause of the Northern states, and Hayne, smarting under some of his animadversions of Southern sloth, made a two-day speech in which he inveighed against the spirit of New England. Webster's reply, concluding with the immortal words, "Liberty and Union, now and forever, one and inseparable," was one of the oratorical masterpieces of all times, and accomplished much in furthering the cause of Unionism.

Andrew Jackson succeeded Adams as president and in one week vetoed more bills than any of his predecessors had done in four years. To the chagrin of the North, he abandoned the principles of extreme protection, and his hostility to the United States Bank was the cause of great worry among men of business.

The new country was in the process of finding itself and, as is always the case before solid ground is reached, it swung from one extreme to another. The effect on business was disastrous. New concerns sprang up, mushroom-like, to wilt in a month; and older firms found their financial background wiped away and were forced to shut down their mills and turn away their workmen. New companies took their places, and either failed shortly or built reliable foundations for a future industry.

Through these dangerous and difficult times, however, the Hartford Manufacturing Company, under the firm hand of Orrin Thompson, prospered. It had commenced operations with fifty hand looms, all of them manufacturing two-ply Ingrains. The company weathered the financial panic of 1832, precipitated by President Jackson's veto of the renewal of the National Bank's charter, a panic in which many newly rigged industries were wrecked on their maiden voyage.

The following year, 1833, a new factory building was erected at Thompsonville with a plan to manufacture three-ply Ingrains, and a

short time afterwards the first three-ply Ingrains ever made in this country were on display by the Hartford Manufacturing Company. As was the case in most carpet factories of this early period, Ingrains were the staple product, and the Hartford Manufacturing Company added fifty hand power Ingrain looms in 1841, erecting new brick buildings to accommodate them.

In 1842 the manufacture of Brussels carpets was undertaken on forty-one new looms. Moquette, a fabric similar to the present-day Axminster, followed, and in 1845 the total number of looms used by the company were two hundred and fifty, five times the original equipment.

By that time the village loafer, if he had not been pressed into gainful occupation as a sorter of wools or an assistant mechanic, could have died, gloomily content that his prophecy had come true, and he had lived to see Thompsonville an energetic industrial town!

In 1854 the Hartford Manufacturing Company was reorganized, to become the Hartford Carpet Company. T. W. Allen of Hartford was elected president of the new company, and E. G. Howe, treasurer. At the request of the stockholders, Orrin Thompson, the founder of the original company, accepted the superintendency of the mills and held that position continuously until 1861.

Mr. Thompson in 1840 had purchased a large factory at Tariffville, organizing the Tariff Manufacturing Company. He installed the Bigelow power looms and built new buildings there at the same time that those improvements were undertaken by the company at Thompsonville.

In 1859 the Hartford Carpet Company bought the factory at Tariffville and the business was continued in both towns under the same management. About six hundred operatives were employed at each factory.

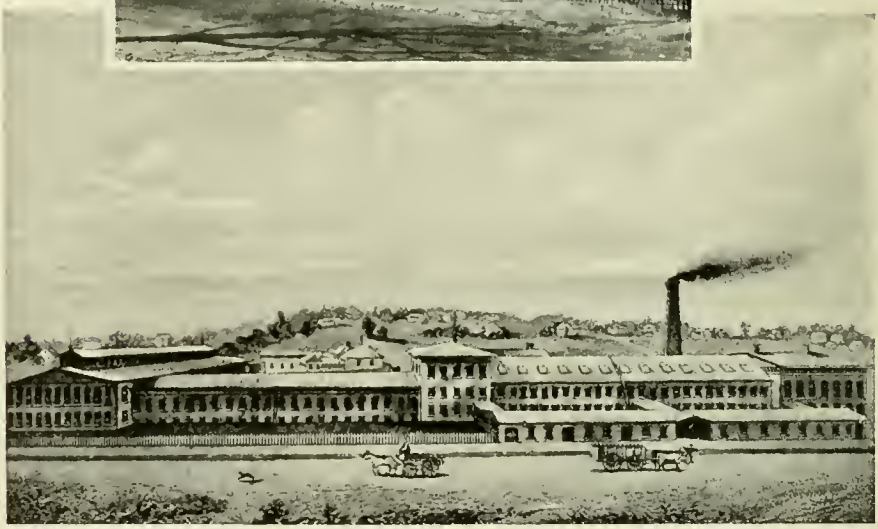
On June 10, 1867, the Tariffville mill was destroyed by fire and was never rebuilt. The capacity of the mills at Thompsonville was doubled immediately by the addition of new and improved machinery and by new buildings. In 1870 a 500 H. P. engine made by the firm

Main Street, Thompsonville, Conn., showing on the left one of the original mill buildings of the Hartford Mfg. Co., built in 1848.

This rare old photograph shows the employees of the Hartford Carpet Co. of almost 50 years ago, grouped in the mill yard.

Above
Spinning mills of the old Bigelow Carpet Company, Clinton, Mass., as they appeared in the late '70's.

Left
In this building, still standing in Clinton, Mass., Erastus B. Bigelow perfected and set up his first power loom for weaving Brussels carpets in 1849.



Weaving mills of the old Bigelow Carpet Co., Clinton, Mass., during late '70's.

of Woodbury & Beach was installed, and this was at the time the largest stationary engine in the State.

During most of this time George M. Roberts was president, having succeeded Mr. Allen, whose term of office extended over only a few years. At the death of Mr. Roberts, in 1878, John L. Houston was made president. Under his very successful management the business continued to grow and many changes were made, the most important being the establishment of the Moquette department in 1879; at this time fifty power looms were installed under licenses from Alexander Smith & Sons Carpet Company, which controlled that process of manufacturing.

In 1896, following Mr. Houston's death, George Roberts, son of the former president of the same name, became president and continued in that office until 1901, when the company was joined by the E. S. Higgins Carpet Company to form the Hartford Carpet Corporation.

A. & E. S. Higgins and E. S. Higgins Carpet Company

In the year 1833, Elias S. Higgins, a boy of eighteen, came to New York to make his fortune.

His apprenticeship was served during four exciting years, years that must have stirred the enthusiasm of the boy from the little town in southern Maine. For in 1834 New York was thrown into a turmoil of popular riots on the occasion of the first mayoralty election in that city. Again the following year the city was distracted through causes of an entirely different nature, for on December 16 a disastrous fire destroyed most of the commercial houses of the city. Five hundred and thirty houses burned, and at an estimated property loss of $18,000,000, a vast sum of money in those troubled days.

The following year the Federal Post Office and Patent Office at Washington burned, causing irreparable loss by the destruction of 7,000 models and 10,000 designs of new inventions.

These events took place against a background of Indian Warfare, anti-slavery agitation, and presidential campaigns.

The year 1837 witnessed the most remarkable financial crisis in the history of the country. The government, in the previous year, had provided that all its surplus revenues should be divided as loans among the states. When it called for deposits in order to distribute the $28,000,000 surplus, an immediate shrinkage of specie resulted. As bank after bank suspended, it was found that the paper issue had increased from $51,000,000 in 1830 to $149,000,000 in 1837. Business was panic-stricken, and the mercantile failures of a single fortnight in New York City amounted to $100,000,000.

Undaunted by the spectacle of financial wreckage littering the sidewalks of New York, with all the confidence of twenty-two years, Higgins formed a partnership with his brother, Alvin, for the purpose of engaging in the retail carpet business, the firm being known as A. & E. S. Higgins.

In 1840 they began the manufacture of carpeting on a small scale, making Ingrains only. In 1841 they established a factory at Jersey City and four years later they opened a new carpet mill in Brooklyn which was destroyed by fire shortly afterwards. They secured another factory at Haverstraw, N. Y., which they occupied for three years, at the same time establishing a mill at Paterson, N. J., and buying the carpet mill of Richard Clark at Astoria, L. I.

In 1847 they built a mill at 43rd Street and North River, to which they moved all the looms and machinery from their other plants, adding Body Brussels and Tapestries to the Ingrains previously made.

A few years later a brother, Nathaniel D. Higgins, was admitted to the firm, and upon the retirement of Alvin Higgins in 1857 the firm name was changed to E. S. Higgins & Company.

The rapid and substantial growth of this business might have been somewhat inspired by national events, for while it was taking place vast developments marked our national history. Carson and Fremont were discovering another outlet to the Pacific through the Rocky Mountains, and the idea of a broad country populated some day from coast to coast was becoming general.

Texas was admitted to the Union, as was Florida; and Hawaii was declared independent. Another financial panic occurred in 1839. Morse obtained the first American patent on his telegraph in 1840. In the following year the grain drill was patented, and Wilkes explored the coast of California.

In 1842, shortly after the publication of Graham's Magazine, one of the first American magazines of high literary pretensions, Charles Dickens paid his first visit to this country, and his early impressions of the United States, published later in England, incurred the honest wrath of the well-meaning Americans who had sought to make a favorable impression upon the visiting novelist. Dickens criticized the rawness of the Americans, but what he failed to appreciate was the dynamic energy of that raw material, the unsurpassed faith that led men like the Higgins brothers to build a new industry in the face of fires and financial crises, the great raw genius that was stirring in Science and Industry and Invention.

At the time of the death of Nathaniel Higgins in 1882, the firm had grown from a small, struggling concern, employing a few hand loom weavers, to one employing over two thousand operatives, with buildings covering about seventy-two city lots and an annual production of more than 3,400,000 yards of carpeting.

The outstanding success of the later years of this business was largely due to the inventions of Erastus B. Bigelow, for the right to use the young inventor's power looms had been secured by the concern at the earliest indication of their real importance.

Elias S. Higgins, the head of the business, died August 18, 1889. After his death, the firm was dissolved, and on March 23, 1892, the plant, stock, and business were transferred to the E. S. Higgins Carpet Company, a corporation organized to carry on the industry. Eugene Higgins, only son of the founder, became president; Robert P. Perkins was secretary; and George S. Squire, general manager.

In 1896 Robert P. Perkins became vice-president. In 1899 he bought the controlling interest in the company from Eugene Higgins

and a month later was elected president. George S. Squire was elected secretary and treasurer.

In 1901 the E. S. Higgins Carpet Company merged with the Hartford Carpet Company to form the Hartford Carpet Corporation.

The Clinton Company and the old Bigelow Carpet Company

A young medical student named Erastus B. Bigelow, whose interesting career is treated in the following chapter, had invented a machine to weave coachlace by power. This young man, whose subsequent inventions were to revolutionize the carpet industry, had once stayed at the Clinton House in New York City, and the service of the hostelry, or the marbleized columns of the spacious lobby, or the food served there, must have been particularly good, for when in 1838 Erastus B. Bigelow and his brother, Horatio N., began the manufacture of coachlace in a neglected mill in Lancaster, Mass., the company was called "The Clinton Company"—for no reason other than the fact that the younger Bigelow had enjoyed a brief visit to the Clinton House in New York.

At the outset, the Clinton Company had a capital stock of $20,000, and Israel Longley of Shirley was chosen the first president. The next year Stephen Fairbanks of Boston was elected president and Mr. Longley, treasurer. In 1841 Mr. Fairbanks was re-elected president, and John Wright of Lowell became treasurer, and upon the latter's resignation H. N. Bigelow was chosen. In 1842 Mr. Longley sold his stock to H. N. Bigelow and Mr. Wright sold his to E. B. Bigelow, thus bringing the affairs of the Company more closely under Bigelow control.

The Clinton Company enjoyed a prosperous business in coachlace during the decade following its establishment, but it is chiefly of importance to this narrative in that it was the parent enterprise to the present great carpet plants at Clinton, Mass.

In the first place, the coachlace loom embodied the fundamental principle later developed by Erastus B. Bigelow into the Brussels

carpet loom. Furthermore, it was in one of the buildings that had housed minor industries subsidiary to the Clinton Company, and located on the company's property, that the "naturalization" of the remarkable Brussels loom took place.

This building, 200 feet long by 42 feet wide, and two stories high, had been erected in 1847. It was taken over by the Bigelow brothers, under the firm name of H. N. & E. B. Bigelow, in 1849, and in it were built and set up a number of the new looms, driven by a 30 H. P. engine. It is interesting to note that this building is still standing adjacent to the plants of the spinning department of the Bigelow-Hartford Carpet Company at Clinton,—a landmark of more than a little interest to residents and visitors alike. A photograph of this historic building appears opposite page 19.

By the summer of 1851 there were 28 looms in operation, producing a daily average of 500 yards of Brussels carpeting. About 50 men and women were employed. A royalty of one cent per yard was paid to the Clinton Company in consideration of its rights in the patents.

In 1854 Henry P. Fairbanks, who had been the partner and business agent of the Bigelows, died, and that same year witnessed the incorporation of the firm under the name of the Bigelow Carpet Company.

The organization of the old Bigelow Carpet Company was effected on July 6, 1854, with Stephen Fairbanks (son of H. P. Fairbanks) as first president. He continued in that office until 1866, when he was succeeded by E. B. Bigelow, who died in office in 1879. H. N. Bigelow was treasurer from the date of organization until 1861; C. A. Whiting followed until 1874; and finally Charles F. Fairbanks (son of Stephen, and grandson of Henry P.) became treasurer, to continue throughout the remainder of the existence of the old Bigelow Carpet Company.

But to return for a moment, lest we get ahead of our story, the Bigelow Carpet Company, immediately after its incorporation, started the expansion which was to make it one of the greatest concerns of its kind in the world. By the beginning of 1855, it had completed a new brick mill 145 feet long by 53 feet wide.

In 1857, 1858, and 1862 the Bigelow Carpet Company purchased various machinery, patent rights, and real estate from the Clinton

Company, and in 1863 that venerable mill which had assisted in the birth of a new industry was closed and the firm dissolved. In 1860 a dyehouse was erected and, after the purchase of the Clinton Company, work was commenced on extensive additions.

In 1864 one of the present spinning mill buildings was erected, together with a wool sorting house and a wool washing room. A new 150 H. P. engine also was installed at this time.

Any detailed account of the development during the latter decades of the history of the old Bigelow Carpet Company would be simply a narration of matters relating to improvements in manufacturing processes, additions to plant, machinery, and other equipment, and general expansion and growth of the world-famous industry centered here in the picturesque hills of eastern Massachusetts.

Suffice it to say that the history of the old Bigelow Carpet Company is typical of the histories of many of the characteristic American industries, founded upon inventive genius, fostered by business sagacity, and prospering through absolute integrity in all its dealings with its employees and its customers. Literally, thousands of yards of carpet made by the old Bigelow Carpet Company are still in service, and we venture the assertion that thousands of yards will still be in service a generation or more hence. That was the kind of carpets they made—the kind that made the name "Bigelow" one to conjure with throughout the carpet trade.

The old Bigelow Carpet Company went forward until the year 1899, when it united with the Lowell Manufacturing Company to form the new Bigelow Carpet Company.

* * *

In this chapter we have sketched briefly the history of the four venerable and worthy ancestors of the present Bigelow-Hartford Carpet Company. But in the beginnings of this industry there was something far more remarkable than mere corporate enterprise, however great the progress and accomplishment of the latter. We refer to the inventive genius of Erastus Brigham Bigelow—and, indeed, to the man himself, for it was his influence more than any other which enabled the infant American carpet industry to come into its full estate—to attain its full stature—through Power Machinery.

Chapter Two

The ADVENT *of* AMERICA'S CARPET-MAKING GENIUS ERASTUS BRIGHAM BIGELOW

SOMEWHAT over a hundred years ago, there lived in the town of West Boylston, Massachusetts, in a plain New England farmhouse, one Ephraim Bigelow and Polly, his wife.

Ephraim Bigelow "farmed it" during the summer months, and in winter turned wheelwright and chair-maker, being a man of some untutored mechanical ability. Polly did the household tasks, and was a favorite in the village—admired by her townswomen as a sterling housekeeper and a splendid mother.

Scanning certain biographical articles published at about the middle of the 19th century, prepared by authors apparently laboring under the belief that a man who was "poor *but* honest" was exceptional, we read that Ephraim Bigelow was "a man of very moderate means, *but* his wife was a woman of fine presence, much dignity, strong character, and good sense." In spite of this Victorian phraseology, we must believe that Ephraim was a man of enterprise, for he became a cotton manufacturer in the days before cotton mills were at all common.

To this sturdy New England couple were born two sons, and one of them, Erastus Brigham Bigelow, born April 2, 1814, was a "problem" to his parents in his boyhood, and a glory to them when he had become one of the foremost industrial inventors of the United States.

Erastus and his older brother, Horatio, attended the district school when it was in session and assisted their parents in the work on the farm and in the shop when they were not engaged in study. The younger boy possessed to a remarkable degree the power of application and concentration and he had inherited from New England parents a determination that often perplexed them.

At the age of eight, Erastus wished to study arithmetic, but the teacher of the little district school thought that he was not old enough and refused to allow him to enter the class. But young Erastus was "set" and, taking a copy of Pike's textbook home with him, he pursued his studies alone, performing every problem as far as proportion.

When he was ten years old, he went to a neighbor, Mr. Temple, and asked for work. He was put to farming, and for three summers he hoed corn and picked apples and milked cows, receiving as his wages four dollars a month. He was thought to have some musical ability and as a boy was proficient on the violin, but the only record of a public appearance was in the orchestra of the Orthodox Society of Lancaster, in which he played a decided "second fiddle." Even as a very young boy he displayed a constructive talent, making improvements on farming tools, and thus giving promise of his future success as an inventor.

His aim lay, however, in neither music nor invention, for while a pupil in the grade school, he had conceived the desire for a liberal education, and a college course was his ambition; for years any other activities were merely means to this end. His father, however, had established a cotton mill, and Erastus, aged thirteen, was needed to tend the spindles. It was dull work for a growing boy, but he contrived to brighten the hours by plans and visions of the future.

His hands were busy with the bobbins, and his eyes had to follow the machine, but his mind was active in conjuring up the beauties of the academy and the college. When this pastime grew tiresome, he turned his thoughts to the possibilities of the material with which he was working, and at the age of fourteen he constructed a loom for

Erastus Brigham Bigelow
Inventor of the first Power Looms for Carpet Weaving

Photograph of British Letters Patent, with Great Seal attached, granted Mr. Bigelow for power loom improvements in 1867. Both sides of the seal are shown in the inserts.

Piece of original coachlace woven by the old Clinton Co., on loom invented by Mr. Bigelow. The coachlace loom embodied the principles later developed by Mr. Bigelow into the Brussels (and Wilton) loom.

weaving suspender webbing. But the "gallus" was not then in popularity, and although the machine accomplished its object, the demand did not justify the employment of an operative and the loom was discarded. This was an early instance of his neglect to study the field before preparing an article for which there was no demand, and his lesson was learned in a more expensive manner when he grew older.

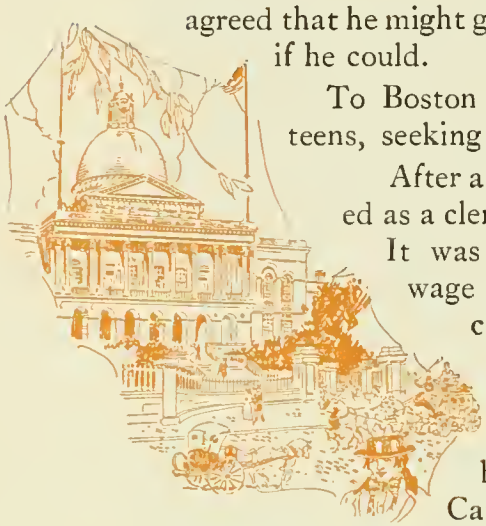
A ball of cotton cord, known in the market as "piping cord," was brought into the Bigelow home for domestic use and attracted the boy's attention. Upon examination he found it to be of yarn such as that which he was spinning every day. He asked questions, boy-like, and learned that it was made in the ordinary ropewalk. The more he thought of that ball of cord, the more the ideas went flickering through his mind. In a few weeks he had matured the plan for a machine on which to manufacture such cord, and within two months he had it in successful operation. It worked well, earning for its youthful inventor the sum of one hundred dollars in a year.

These developments of what is now known to have been a peculiar genius were due to his burning desire for an education. They awakened in him no suspicion that he possessed special talent along mechanical lines, no ambition to shine as an inventor. They were merely temporary expedients to earn a little money.

By 1830, when he was sixteen, Erastus B. Bigelow had saved a small amount of money, and he obtained the consent of his parents to attend the Leicester Academy at his own expense. His father, a conservative man, self-made and prejudiced, would have preferred to see his son enter a trade, but Mrs. Bigelow, with the rare and often inexplicable intuition of a mother, felt that schooling was advisable for the boy, and he entered the academy to study Latin.

Erastus did so well in his work that his teacher wrote Mr. Bigelow advising a college course for his son. The father, however, was not in sympathy with the idea, and the boy was forced to return home when his small fund was exhausted. The cautious parent was pleased to have him "settled down" again and wished him to begin work in the cotton mill at once. But young Bigelow felt that there must be something bigger ahead of him, and after many family conclaves in

which Erastus showed himself "stubborn and set in his ways," it was agreed that he might go to Boston and become a commission merchant if he could.



To Boston he went, a determined, awkward boy in his teens, seeking some undecided goal.

After a few inquiries from office to office, he was accepted as a clerk in the dry goods store of S. F. Morse & Co. It was a prosperous business, but young Bigelow's wage was too small to allow him to save for his education, and once the novelty had worn off, the measuring of ribbons and dotted Swiss for volatile ladies of fashion became monotonous. The ideal of a college course still haunted the boy, and on one occasion he walked out to Cambridge and talked with President Quincy of Harvard University. It only served to show that there was no chance for him yet.

About this time a teacher of stenography came to Boston and gave lessons in the subject. Erastus B. Bigelow was interested. Here was a new field to conquer, but the cost of the course was ten dollars and that was beyond his means. He got some books and taught himself, surprised that the subject was so easy to master. In a few days he could write with ease in shorthand, and a new thought struck him. Why shouldn't he write a book on this art, helping others to avail themselves of the useful, labor-saving processes which he had discovered? In a short time his work—*The Self-taught Stenographer*—was ready for the press. With no misgivings, he gave up his post behind the counter and embarked upon a career as his own book agent.

In ten days he made seventy-five dollars selling his book in Boston. Forgetting that the city had just been prepared for him by the presence of the teacher of stenography, he regarded his sales there as an indication of the national demand, and immediately ordered a large printing of the book.

To meet the extensive business now opening before him, Bigelow took as a partner a young medical student who was anxious to see

something of the world before he settled down to the exacting drudgery of a public servant. The young doctor was to pay the entire cost of printing, to share equally in the labor and expense of the distribution and sale of the book, and to receive one-half of the profits.

The adventurers set out at once on their commercial travels. They visited the most inviting parts of New England, New York, New Jersey, and Pennsylvania. Presently the cholera, sweeping over the country, put an end to their voyaging. They returned home, having made about one hundred dollars. Four hundred dollars was still due the printer, a large part of the edition was yet on hand, and all the best ground had been canvassed. Bigelow without hesitation released his discouraged partner from the pecuniary obligations.

At eighteen, Bigelow's education fund had vanished, his schemes had all failed, and he was four hundred dollars in debt.

His father had been extending his business and, having built a new mill, allowed the boy, with a friend, John Monroe, to set up a twine factory in the old mill. But a disagreement between Bigelow, senior, and his partner deprived the younger firm of the use of the mill. Young Bigelow and Monroe then undertook to run a cotton factory in Wareham, a town in eastern Massachusetts, but at the end of nine months this arrangement terminated in a loss. As author and manufacturer, Bigelow was now obligated to the extent of fourteen hundred dollars.

Everything seemed to go wrong in Massachusetts, so the young man turned to New York with the same hope of success that had been in his heart as he entered Boston. He succumbed at once to the prospectus of a writing instructor and found that his penmanship had so improved that he was able to teach the art in Newark and several other towns in New Jersey and on the North River. But teaching penmanship in busy towns, traveling from city to city, and staying each night in a different hotel, all the time uncertain of the success of the next day, could not be satisfying to a young man troubled with educational aspirations.

He regarded his stock-in-trade; he cataloged his abilities and experiences,—two small looms weaving materials for which there was

no demand; a large number of undesired textbooks on self-taught stenography; a knowledge of cotton mills, ribbon counters, and the "art of penmanship,"—that was all. And the vague unrest of aspiration was stirring within him.

He returned home to his family, whose tenderness and regard showed only too clearly that Erastus *was* a problem. Family councils were held, and many plans were conceived and rejected, until at last, with unanimous approval, the boy resolved to become a physician. After a winter spent in classical studies, he entered his name as a student of medicine.

If only he had the money to insure himself the background of a more perfect literary training! Again the stimulus of his early desire put him on the lookout for some source of pecuniary gain. It was at this time that he paid a visit to a friend and slept under a Marseilles quilt, a knotted fabric woven in diamond-shaped designs popular in those days. He remembered that he had once seen them woven by hand, a slow and very expensive method, and, setting himself to work on the problem, he invented a power loom that could weave these quilts to the satisfaction of everyone.

The firm of Freeman, Cobb & Company of Boston took the invention, agreeing to look after the patents, do the manufacturing, and give the young inventor one-fourth of the profits.

It looked as though a brighter day was dawning for the young medical student. At last he could pursue his studies without worrying about funds; so he put himself in the hands of a tutor and planned to enter college the following year.

He was now in his early twenties and he saw ahead of him his ambitions attained. But in December of 1835 the Great New York Fire had destroyed many industrial houses, and the country was embarked upon the lean years of financial depression. New York firms were forced to close, and business in New England suffered as a result. Freeman, Cobb & Company failed, and to increase young Bigelow's misfortune, his father's business began to show a reflection of the general depression. It was a sad period for the

country; "hard times" were "a-knocking at the doors" of the North and South alike.

The plan for a college career was by necessity thrown into the discard. He searched his mind for some possible method of gaining money and recalled that once in his journeys as a stenographic barnstormer he had seen coachlace woven by hand. He had not paid a great deal of attention to the factory at the time, and all that he could recollect was that the fabric was made on a hand loom.

A few days of study showed him that a power loom was feasible, but he had learned by bitter experience that unless the article was in demand, his time and money would be wasted.

Hiring from a neighbor a work horse, and with an old yellow-bodied chaise, he drove off one morning on a tour of inquiry. Were it not for his earnestness, he would have made a ridiculous figure, perched upon his antiquated carriage, waving his whip over the stocky, bewildered old work horse. But he was in deadly earnest; he knew that he could invent a loom that had always been considered impractical. He could scale the impossible—*if* there was a demand for the products of his effort. Accordingly, he questioned the carriage makers of Worcester, Grafton, Framingham, Medway, and Dedham, and in each place he was referred to Messrs. Fairbanks, Loring & Company of Boston, wholesale dealers in coachlace.

So the brilliant yellow chaise with its silver-gilt lamps, drawn by a horse whose patient old eyes expressed a longing to be back on the farm again, and directed by a keen-eyed youth in whom the hope of a fortune had not been drowned by repeated failures, went rattling over the cobblestones of Washington Street and came to a halt before the astonished windows of Fairbanks, Loring & Company.

A coachlace power loom, he was told, would certainly do well; but the thing had been considered often by the principal lace makers and pronounced an impossibility. They expressed a wish to join

him in case of his succeeding, though, as they afterward confessed, without the slightest faith in the project.

Bigelow went home, and with no other guide or help than a piece of coachlace, set himself to the accomplishment of a task which had been condemned as impossible. Coachlace is a fabric that somewhat resembles Brussels carpeting in its structure, having a raised figure on a plain ground, woven on a very narrow loom from two to four inches wide. It is the prototype of the figured straps and bindings of the luxuriously upholstered limousine. The loom that Bigelow contrived was necessarily very complicated. Spurred on by his necessity and encouraged by a confident hope of success, Bigelow's mind became intensely active.

To his family he seemed to have become inexplicably stupid, and neighbors, with true neighborliness, felt that Mrs. Bigelow "ought to know" that some of the townspeople feared for the boy's sanity. When he was spoken to he appeared to listen, but his irrelevant replies or his utter silence showed that he had not heard a word. One evening a friend called, and the family sat visiting in the parlor, throwing a word now and then to the abstracted young man, who would reply absently with answers to questions asked an hour before at the dinner table.

When the guest rose to leave, Mrs. Bigelow asked the boy to light him to the door. He got up gravely, and, taking an unlighted candle, led the bewildered guest stumbling and groping through a long dark passage. When he came to a rough board or a turning in the hall, he politely raised the unlit candle that the guest might see more clearly, and then bowed him unsmilingly from the door!

Thus the boy pondered and planned and worked for forty days, and at the end of that time he had a power loom in successful operation.

When we consider that this invention contained many of the essential principles of his other great inventions and led naturally to the carpet loom which is to-day giving employment to thousands of workmen and adding to the comfort of millions throughout the world,

we may begin to appreciate the fact that this was an important period not only in the life of Bigelow, but also in the history of civilization.

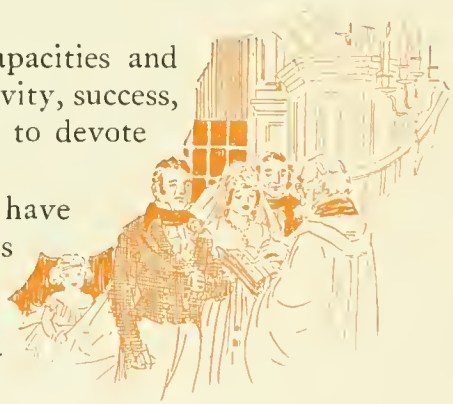
After the loom for weaving coachlace by power had been invented, the next thing was to put it into practical operation. Erastus B. Bigelow turned to his brother, Horatio N. Bigelow, who was then superintendent of a mill in Shirley, Mass.

The brothers were faced at the outset with the question of where they could get the best ready-prepared facilities for manufacturing this coachlace at the lowest prices. Fortunately for the "Factory Village" of Lancaster, Massachusetts, the hard times had destroyed the confidence of the cotton manufacturers, and two of them were glad to lease the "Yellow Mill" for a small rental. This was just the opportunity that the two young men wanted, and they seized it at once. Horatio furnished what capital they had, but this was so small that the necessary machinists worked for several months before receiving any pay, simply from their faith in the final success of the loom. Their faith was not shattered, for in a short time it was clear that Erastus B. Bigelow's invention could manufacture a greater supply of a commodity of better quality and at a smaller expense.

The complete success of the coachlace loom brought the inventor at once into notice. Stephen Fairbanks (a member of Fairbanks, Loring & Co.) of Boston, John Wright of Worcester, Israel Langley of Shirley, together with the inventor and his brother, united for the purpose of running the looms.

Erastus B. Bigelow was now in a position to embark upon his long-desired and long-deferred college career, but he knew that the time for that had passed.

He had begun to see more clearly his own capacities and abilities; he saw opening before him a career of activity, success, and usefulness. And to this end he now resolved to devote his future life.



One is led to believe that another reason may have influenced his decision to give up college. This was in 1838. About this time Bigelow courted and married Susan King, and although little is known of the courtship or their married life, we do know

that many a career of letters has been sidetracked for an industrial life because a man and a maid wished to marry.

Soon after the Clinton Company began operations in Lancaster, Freeman, Cobb & Co. found themselves financially on their feet again, and a member of the firm immediately contracted with the inventor on highly favorable terms for a number of the counterpane looms which he had designed for them before their failure. In the meantime, however, Erastus B. Bigelow had happened to see in New York a new and different kind of counterpane just imported from England. An examination of the fabric convinced him that it would be more marketable than the knotted counterpane and could be made more cheaply. He advised the Boston firm to lay aside the existing contract and agreed to invent a power loom for weaving the new fabric. Within six months he had the loom completed and operating successfully.

After starting the coachlace and counterpane establishments, Mr. Bigelow took up the problem of weaving Ingrain or Kidderminster carpets by means of power looms. It was an extremely difficult matter to produce a fabric in which the figures should match, which should have a smooth, even face and a perfect selvedge, and to do this with a rapidity beyond that of the hand loom. The hand-weaver can, to some extent, meet these conditions by the exercise of his judgment. If the shuttle has not fully done its work, he can give the weft-thread a pull with his fingers. When, upon measuring, he finds that the figure is getting too long or too short, he can remedy the fault by putting either more or less force to the lathe as he "beats up." If he perceives that the surface of the cloth is becoming rough, he regulates the tension of the warps. By the exercise of constant vigilance, skill, and judgment, he can turn out a complete and regular fabric.

But how could these faculties be imparted to machinery? How could iron be taught to observe, to judge, and to vary its action with each modification as the case might require? A drama of the present day has dwelt upon the "Robots,"—iron men who will act as servants sometime in the dim and far future. The play is called fantastic. Yet iron servants that obeyed the commands of men, that cared for unexpected exigencies as capably as men with brains, that plucked slender threads with iron fingers and halted the machine if a thread were broken—these "fantastic" iron men were the invention of a

Gold Medal Award of the Massachusetts Charitable Mechanic Association to the Hartford Carpet Company for excellence in Wilton and Brussels Carpets.

(On the next page are shown some of the score and more of similar awards won by the Bigelow Carpet Company.)

1. U. S. Centennial Exposition - Philadelphia - 1876

2. New England Society Mechanic Arts - Boston - 1826

3. Franklin Institute - Philadelphia - - - - - - 1833

4. Louisiana Purchase Exposition - St. Louis - 1904

5. New England Agricultural Society - Boston - 1872

6. Middlesex Mechanics Association - Lowell - 1867

7. American Institute - New York - - - - - - - 1834

8. Louisiana Purchase Exposition - St. Louis - 1904

thoughtful, capable "magician" who lived in the 19th century as a rather quiet young man named Bigelow.

A short study had convinced Bigelow that this apparent impossibility was practicable. On the strength of his conviction — before he had made a model or even complete drawings of the machine — he entered into a written contract with the Lowell Manufacturing Company, in 1839, to furnish power looms for the manufacture of Ingrain carpets. According to the agreement, Mr. Bigelow was to give his time to perfect his invention, and the company was to construct a trial loom and, in case of success, build a mill for his looms and pay him a patent rent. His first loom for two-ply Ingrains was set up within the year. In the matching of figures, in evenness of surface, and in the regularity of selvedge, its product far surpassed that of any hand loom. The iron man proved more careful, more capable, more reliable than the man with the brains. Its average output was from ten to twelve yards a day; that of the hand loom was about eight.

But Bigelow was not satisfied. A second loom with various modifications was made, by which the daily product was raised to eighteen yards. Still he felt he could do better, and a third loom with other changes was set up. This loom put out from twenty-five to twenty-seven yards a day. The other looms, like the first counterpane invention, were thrown into the discard.

The last loom was built in 1841. That autumn, Mr. Bigelow visited England and found that in many ways British manufacture was superior to the American. The American manufacturers with whom he talked at first refused to believe this, but it was not long before the practical adoption of his suggestions showed that they had taken full effect.

In 1842 the various manufacturing corporations of Lowell created a new office with a salary exceptionally liberal for those days, and appointed Erastus B. Bigelow to fill it, his duties being to advise and suggest improvements in consultation with the agents of the respective companies. This brought forth some important changes which were adopted by all the textile companies of Lowell. He found, however, that this office was too general in its characteristics and

duties to be satisfactory, and at the end of eighteen months he resigned. With his retirement the office itself expired. During this period he had projected a new manufacturing establishment at Lancaster for the weaving of ginghams and had built for the Lowell Manufacturing Company a mill to receive his power looms.

Thus, in 1843, was begun at Lowell, by the Lowell Manufacturing Company, the first successful power-loom carpet mill ever in existence in the world.

Both of these new mills were large in size and unique in character. The Lowell mill, with its two hundred iron looms, was in reality a huge carpet machine, for the mill and its furnishings were so combined and adapted as to produce remarkably harmonious action and the best possible results.

The Lancaster mill covered more than four acres of ground and was filled with machinery and apparatus much of which was invented or adapted, and all of which was arranged and adjusted, by Mr. Bigelow. It was indeed a supreme industrial achievement, and Hunt's Merchant's Magazine of the period asserted that it was "the most perfect establishment in the United States." The editor considered the dyehouses "the most perfect in the world," adding that "in its vast completeness stands a splendid monument to the genuine and masterly power of the mind of its projector."

"Of Bigelow's business talent, his constructive abilities, and clear, far-reaching mental vision," says the Merchant's Magazine, "some estimate may be formed from the fact that expensive, complex, various, and costly as these works were, not even fifty dollars were lost from any change of plans."

At the same time, Erastus B. Bigelow superintended the enlargement of the counterpane works and the mills belonging to the coach-lace company and, during this period of three years, patented nine new and important inventions. It is not surprising that his mind and body grew weary, while his family and his physician harassed him with advice and begged him to take a greatly needed rest.

Perhaps the financial success of his various business interests put him in a more fortunate position than many similarly tired business men; perhaps the keen mind that brought forth such inventions as his was guided by more common sense than is given the average man; at any rate, whatever the cause, unlike most men of thirty-four who

are overworked in mind and body, he stopped talking about the vacation he would some day take—and actually took it. Idle hours spent in the resorts of the continent, hours of easy contemplation of old world loveliness—of gray, romantic London; of Paris of the many moods; and Vienna, the sophisticated center of a woefully wise old world. Idle hours and full ones restored his health and rested his overtaxed mind, and in 1848 he returned to America, ready to develop the most complicated of all his inventions—the Brussels carpet loom.

The basis for the machine was the coachlace loom, but further invention was necessary to adapt it to the weaving of wider fabrics, to the matching of figures, and to the formation of velvet pile. He also produced variations of his invention to weave Wilton and Tapestry Velvet carpets. Specimens of these carpets were shown at the London Exhibition in 1851, but they arrived too late to be judged for the award of prizes. In a supplement to the announcement of the awards, however, the committee stated, "The specimens of Brussels carpeting exhibited by Mr. Bigelow are woven on a power loom invented and patented by him and are better and more perfectly woven than any hand-loom goods that have come under the notice of the jury. This, however, is a very small part of their merit, or, rather that of Mr. Bigelow, who has completely triumphed over the numerous obstacles that presented themselves, and succeeded in substituting steam power for manual labor in the manufacture of five-frame Brussels carpets. Several patents have been taken out by different inventors in this country for effecting the same object; but as yet none of them has been brought into successful or extensive operation, and the honor of this achievement—one of great practical difficulty, as well as of great commercial value—must be awarded to a native of the United States."

At this time the product of a hard day's work of ten to twelve hours for a weaver, including a boy to draw the wires, was seven yards of Brussels carpet. Mr. Bigelow's loom raised this at once to over twenty-five yards of a far superior fabric, and since that time the output has grown steadily until over fifty-five yards a day has become possible.

The practical manufacturers of England were quick to see and prompt to acknowledge the value of the new machinery. An arrangement was immediately made with Crossley & Sons for placing the looms in their immense carpet factory at Halifax; later this firm purchased the patent-right for the entire United Kingdom.

Previous to the introduction of Mr. Bigelow's invention, power looms had scarcely been used for any but the plainest and simplest fabrics. His improvements cover the whole higher range of textile art. With the possible exception of the pictured tapestries woven in the Gobelins as royal wedding presents from the French government, there is no fabric, however complex, useful, or beautiful, woven with skill and patience on the hand looms, to which this machinery cannot be adapted.

Prior to the perfecting of this invention in 1849, Erastus B. Bigelow had, with his brother Horatio, formed the firm of H. N. and E. B. Bigelow, which had the honor of operating the original power factory devoted to the manufacture of Brussels and Wilton carpets. The management of this plant, as well as the supervision of the coachlace, counterpane, and gingham factories, and his much-sought assistance in installing and modifying his inventions in many other mills, kept Erastus Bigelow an extremely busy man.

The "Factory Village" of Lancaster (that section containing and surrounding the new mills) became the industrious town of Clinton by an act of legislature in 1849. In 1854 the Bigelow Carpet Company was organized. The mills, which drew hundreds of workmen to the town and enabled them to support themselves and their families, had originated out of the mechanical genius of Erastus B. Bigelow, and had expanded and prospered through the executive talents of Horatio N. Bigelow. It is small wonder that Clinton came to regard the Bigelows as its patron saints. The feeling was increased by the almost paternal interest which they took in it, and the sacrifices they made for it. Having suffered privation in their own youth, they made it possible to offer every opportunity to the young people of the town in whose development they were so keenly interested.

Later in life Erastus B. Bigelow made a study of the tariff and taxation in general, publishing various articles on the subject. In

1862 he prepared a scheme for universal taxation throughout the country by means of stamps, and in 1863 he published a book entitled "The Tariff Question, Considered in Regard to England and the other Interests of the United States," the latter raising the wrath of a few British critics who found the Protective Tariff not to their liking.

Mr. Bigelow made necessary inventions from time to time, fifty in all, but the greatest of his achievements had been accomplished. The work following the invention and establishment of his carpet looms dealt with minor appliances and small changes in the mechanical details of the looms.

In his later life he found the time, at last, for those cultural interests to which he had desired to apply himself as a youth. He spent his time quietly but energetically—writing, supervising his mills and his inventions, fostering the cause of education. He was one of the founders of the Massachusetts Institute of Technology. He was honored by Harvard, Yale, Williams, and Dartmouth with the degree of M. A., and by Amherst with that of LL. D.

Mr. Bigelow died in Boston, December 6, 1879, one of the outstanding figures of the 19th century, one of the industrial pathfinders too little appreciated in an age where "our luxuries are our necessities."

It is a truth that those who dwell by "beauty's font" too often fail to drink because "the cup is ever full." Carpets are a necessity to modern life; they are taken for granted and for that reason one is apt to forget that in the third decade of the 19th century a gesture of democracy was made by an American inventor, a gesture that led the way to power production of luxurious articles on a large scale, calculated to allow the average man the same utilitarian and æsthetic opportunities that were enjoyed by his more wealthy neighbors. Rugs and carpets of lasting beauty, priceless ornaments of superior design, and rich, soft colors, protection against the cold, bare floors of New England's winter,—all this that was once the privilege of a King's son or a prelate of a High Church, was extended to poor and rich alike, whether in America or abroad, and by that democratic gesture of the inventor of the power carpet loom, Erastus B. Bigelow.

Chapter Three

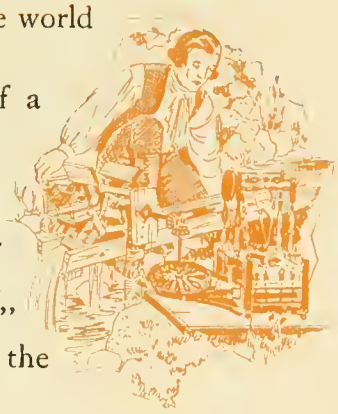
PIONEERING *with* POWER LOOMS

FOR untold centuries man worked with his hands, shaping metals, moulding clay, cutting, weaving, digging, carving. For untold centuries man took care of himself and, in a material way at least, worried very little about being his brother's keeper. The original man was, perforce, a jack-of-all-trades, for it was necessary for him to protect himself, feed, clothe, and house himself, and a man who must devote himself to the construction of the fundamentals has not the time to become a specialist. But the advent of community life brought protection, laws, and specialization. One man sharpened his flints, one man turned the potter's wheel, another constructed rude furnishings, and another supervised his wives at the loom.

But a long time passed before the potter, the carpenter, the tool-maker, or the weaver, looked beyond the horizon of his own valley for a market. When he did, he saw not the poor and the needy waiting for necessities they could not obtain in their own land, but the wealthy whose abundance of money tempted them to surpass their neighbors in equipment and adornment.

Venice was the market in which the world traded, proud Venice, Queen of the Adriatic, to whom came bannered vessels bearing the spices, the jewels, the silks and tapestries of far countries. And to Venice came the merchants of all lands, to return with Arabian horses, pearls from the Indies, sapphires and rubies and diamonds from the Orient, carpets from the Eastern lands, silks from China, woods from the green coasts of Madagascar, and beaten gold from beyond the

frozen barriers of the Steppes. All the treasures of the world for the wealthy, and not a necessity among them!



The years moved on with the aching slowness of a universe, and in the 18th and 19th centuries, A. D., came an industrial revolution that turned the world topsy-turvy and leveled the rich with the poor. For toward the end of the 18th century, an English inventor thought to harness outside powers to a spinning wheel. It was in 1771 that Arkwright invented the "water frame." For ages, people had gone on spinning and weaving with the wheel and loom operated by their own hands.

The invention of the use of steam power may perhaps seem more wonderful at first thought, but this was rather an advance of degree than of kind—just as the adaptation of electrical power marked another advance in degree over steam. But it is the use of *any* external power at all, and not of any one particular kind of motive power, that marks the step of progress. That is why water power, though it did not continue for very long, marked a momentous epoch in industrial history.

The eyes of the manufacturer, with increased production resources at his command, were now turned toward his fellow man. "At last," he said, "I can supply the people of Europe—or of America—with this article which I make, and which they need."

Production was pushed to the utmost and new methods were sought to increase further the daily output.

America was breasting this wave of industry, and her inventors and experimenters were among those leaders of the world who were devising methods of supplying the masses with the necessities they had so long lacked and the comforts that made life so much more worth living.

Mr. Bigelow's carpet looms contributed their proportionate part to this industrial revolution, which was characterized by inventions in every field: cotton, woolen, iron, agriculture, shipping, railroads, mining,—what not?

Crossley & Sons had bought the patent rights of Bigelow's Brussels carpet loom for the United Kingdom, and American carpet makers

were quick to contract for these new looms that would so greatly increase their production.

A. & E. S. Higgins of New York and the Roxbury Carpet Company of Massachusetts secured the exclusive use of Bigelow's looms for the manufacture of Tapestry and Velvet carpets in this country. In 1843, Mr. Bigelow had supervised the building of the new mill and the installation of his Ingrain carpet looms for the Lowell Manufacturing Company,—the first power loom carpet mill in the world. At Clinton, Mass., in his own mills, Brussels and Wilton carpets were manufactured. Axminster looms were added later.

At Lowell, Ingrains were the original product of the Lowell Manufacturing Company, but Brussels and Wiltons were soon added, and later the manufacture of Axminsters was included.

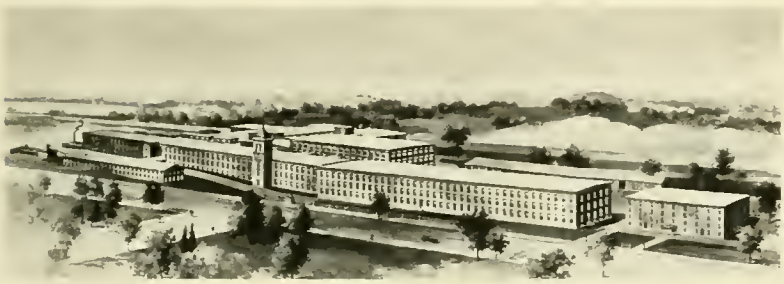
The Ingrain carpet, also called Scotch or Kidderminster carpet, was akin to hand-woven Tapestry, being of a flat ribbed surface, without tufts like Axminster or loops like Brussels. It was made with a worsted or a cotton warp, traversed by a woolen weft, and was usually woven in strips a yard wide.

Although three-ply Ingrains were made by some American mills, the simplest type of Ingrain consisted of a two-ply fabric woven with the aid of a "double cloth Jacquard" in such a way as to produce the same figured pattern on both sides of the carpet, though in reversed colors. This was accomplished by causing the two sets of colored threads to change places, which at the same time fastened the fabrics together. The design and the color effect depended upon the working of the weft, though the incidental appearance on the surface of the warp threads, which were harmonious or neutral in shade, did not disturb the pattern.

In the standard "Extra Super" quality there were 1,088 warp ends in the thirty-six inch width of the more complicated designs, and the surface contained fourteen pairs of weft to the inch, that is, fourteen above and fourteen below. This fineness allowed delicate and ambitious designing and led to very clever and artistic effects in spite of a limitation of color.

An eminent English authority praises an American Ingrain carpet representing the landing of Columbus which "was admirably shaded,

Thompsonville, Conn., Plant of the
Bigelow-Hartford Carpet Company.



Spinning mills of the Clinton, Mass., Plant of the
Bigelow-Hartford Carpet Company.

Weaving Mills of the Clinton, Mass., Plant of the
Bigelow-Hartford Carpet Company.

One of the older streets of "Company houses" at Clinton, Mass.,—comfortable and inviting.

A row of new houses erected by the Company for employees at Clinton. Each accommodates two families, and provides all modern improvements.

"Cottage Green" aptly describes this attractive section of employees' homes at Thompsonville, Conn.

A glimpse of the modern residential development now being carried out by the Company at Thompsonville for employees. This view shows less than half the new, modern, duplex houses already constructed.

and at a little distance might easily have been mistaken for a hand-made tapestry."

The original Ingrain power loom was modified from time to time until it is now nearly impossible to recognize any great resemblance between it and the modern loom. This type of carpet has lost in popularity, due to the development and perfection of the Wiltons, Brussels, and Axminsters; but in the middle of the 19th century Ingrains basked in popular favor and were manufactured in vast quantities and in traditionally high quality by the Lowell Manufacturing Company, the Hartford Manufacturing Company, and A. & E. S. Higgins. This last firm, as heretofore noted, also manufactured Tapestry and Velvet carpets on Bigelow looms that were variations of his Brussels carpet looms.

The success of Erastus B. Bigelow's looms stimulated others to like invention. The manufacture of Moquette carpets by hand in foreign countries was one of the slowest of trade processes. Two men and a boy were employed at one loom and could make but one and one-half yards of French Moquette in a day. Sometime prior to 1860, Halcyon Skinner, acting upon an idea conceived by Alexander Smith of Yonkers, invented a power loom for Moquette and French Moquette carpets that increased the product to eleven yards a day per loom. Because of the destruction of the Yonkers plant by fire, however, this loom had no practical utilization until around 1867.

A few years before Mr. Skinner's invention, Richard Whytock of Edinburgh had brought out a loom for the weaving of "Tapestry Brussels." The underlying principle of this fabric was the attainment of economy in using one frame of worsted yarn by printing or painting the pattern on the threads. This did away with the five frames of different colored yarns which were generally used.

While Mr. Bigelow's harnessing of outside power greatly reduced the number of operatives necessary for hand-loom carpet making, yet it worked no misfortune for the carpet weavers. Inasmuch as his invention both increased the output and cut down the expense, and as the supply in no way met the demand, workmen were not dismissed.

Rather, new looms were constructed, greater production attained, more men employed, and a heroic attempt was made to meet the always increasing demand for luxurious floor coverings at a moderate price. The factories expanded, production grew, importation waned, and carpet making in America waxed prosperous.

A few figures will give a clear conception of the revolution caused by the looms of Mr. Bigelow and his followers. In the spinning alone of carpet material it would take, by the old methods, from twenty-five to one hundred men to do the work of one man in the present day. In weaving, one man with a modern power loom does the work of ten men with hand looms.

In 1860 there were 213 establishments for the manufacture of carpets, with a capital of $4,721,768 and a product valued at $1,857,-636. The first report of actual yardage seems to have appeared in the census of 1880, when the figure of 39,282,634 square yards was given as the total annual production.

By 1923 the total annual production had increased to 81,278,000 square yards, with a value of $190,495,000. At this time the number of establishments was reported as 73. These figures are the more impressive when it is recalled that in 1810 less than 10,000 square yards constituted the total annual output of America's carpet mills.

Prior to the invention of the power loom, Axminster carpets, hand made, had been imported from France, selling at eight dollars a yard. Afterward, however, it was necessary for the French manufacturers to lower their prices two dollars a yard in order to hold their trade. As early as 1878 it was announced that the importation of carpets was nearly over, for the American mills could "make all the Ingrain, two-ply, three-ply, jute and hemp carpets that were used in this country," having "the capacity to produce nearly all the Brussels, Tapestry, and Axminster carpets also."

In the census of 1920 the total number of looms employed in the manufacture of carpets was reported as 8,157. The Ingrain carpet manufacturers employed 620 looms; 1209 were engaged on Tapestry Brussels; 1,714 on Tapestry Velvets; 394 on Body Brussels; 1,225 on Wiltons; 2,111 on Axminsters, and 34 on Moquettes. The number

of hand looms had increased from 31 in 1914 to 260 in 1920, but the total number of hand looms in use in 1880 is reported as 3,995.

The imports of carpets and rugs for the fiscal year 1922 amounted to only 1,453,494 square yards, having a value of $7,819,430, a trifle over two per cent. of the amount manufactured in the United States. The American carpet manufacturers, it is evident, have complete control of the home market, and are able to supply all the needs of the American people.

These figures give an idea of the financial importance of Mr. Bigelow's contribution to industry. Before his inventions, the country relied upon England and France for the majority of the carpets in American homes—and the homes that possessed carpets were few and of the wealthy. Mr. Bigelow's personal business ability, learned in the often bitter school of experience, was extremely valuable to the manufacturers who were pioneering with his looms. They had as an adviser not only a leading inventor of their day, but also a man of sound business sense, clear vision, and great financial knowledge.

To Erastus B. Bigelow, more than to any other one man, is due the solid success and increasing importance of the carpet industry through the past seventy years. One hundred years ago carpet manufacture was a frail experiment; to-day it is one of the truly great industries of America.

Chapter Four

The BIGELOW CARPET COMPANY
(1899)

TWO individual streams of industry, one at Lowell and one at Clinton, changing in their own courses from time to time, growing larger, developing new phases of carpet manufacturing, came together in 1899 to form the new Bigelow Carpet Company.

At the time of the amalgamation of the two companies, Arthur T. Lyman was treasurer of the Lowell Manufacturing Company, and during his eighteen years in that capacity had brought its affairs into excellent condition. Of the old Bigelow Carpet Company, Charles F. Fairbanks was treasurer,—a manufacturer of exceptional ability, a financier, and an expert buyer of wool.

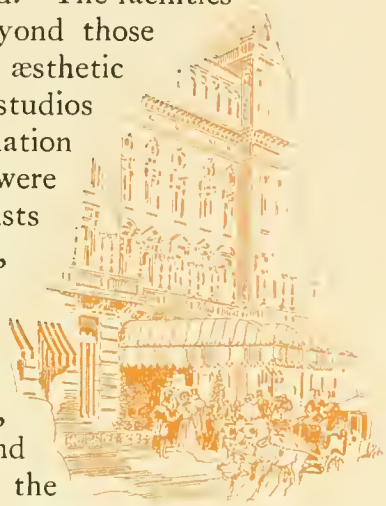
Of the new Bigelow Carpet Company, Arthur T. Lyman became president, and Charles F. Fairbanks treasurer and active manager.

Although joined under the name of the Clinton concern, the mills at Lowell continued to be operated and improved—attaining a floor space of 1,080,000 square feet. The mills at Clinton occupied over 380,000 square feet. During the first decade of the 20th century, the Bigelow Carpet Company was producing an annual average of over 8,000,000 yards.

With the 20th century came the beginning of the "rug era," for the wives of the country had decided that carpeted floors must give way to hardwood floors adorned with attractive rugs. Accordingly, every up-to-date woman got down on her knees—or, more likely, forced her protesting husband to his knees—and tacks flew and dust filled the air, as the staunch old carpets were ripped up and

hurried off to the attic. In their places went Wilton and Axminster and Brussels rugs; lovely reproductions of Oriental and Aubusson fabrics, plain colored rugs with deep, lush pile, and two-toned rugs of remarkable richness.

The Bigelow Carpet Company was prepared to meet this demand with Ardebil Wiltons, Bagdad Wiltons, Bagdad Brussels, Arlington and Electra rugs. The fame of the company spread. The facilities of the Bigelow designing department were far beyond those of the other manufacturing companies, and the æsthetic and scientific studies of design were blended in the studios of the company. Color values were studied in relation to the ground and the ornament, and designs were faithfully carried out in the shades which the artists selected rather than the shades which were in stock, a practice then common among many carpet manufacturers.



Also with the coming of the 20th century, American hotels were entering upon the period of luxurious, quietly tasteful appointments, and Bigelow carpets and rugs were selected by the best managements, even as the Bigelow-Hartford products are to-day found in the representative hostelries, theatres, and mercantile establishments of this country. Among these hotels were the Knickerbocker, the Belmont, the Waldorf-Astoria, the St. Regis, the Astor, the Murray Hill, the New Plaza, the Gotham, the Martinique, the Fifth Avenue, and more than a score of others in New York City. Delmonico's and Shanley's, those famous bygone New York restaurants where the fashionable met for tea and formal dinners and for sporting little after-theatre suppers, and where the climbers met and imitated their social peers,—these rendezvous that will soon be only a name in America's social history were carpeted with the rich, soft carpets of the Bigelow Carpet Company.

The members of the Union League Club, in New York City, trod in silent luxury on Bigelow carpets. Expensive brides were given in marriage by their wealthy fathers to men of wealth, to poor members of the first families, or to poorer members of foreign nobility, and knelt

on the Bigelow carpets of the Broadway Tabernacle, St. Patrick's Cathedral, or the Fifth Avenue Presbyterian Church. Afterwards they walked over rugs made by the same company and spread beneath their careless feet in the Tuxedo Club at Tuxedo Park, the Royal Poinciana at Palm Beach, the Aspinwall at Lenox, the Marlborough-Blenheim at Atlantic City, and the New Willard at Washington, D. C.

The old Back Bay aristocracy of Boston found Bigelow carpets to greet them when they entered the Touraine, or the Parker House, or the Brunswick; the boards of directors, so interested in the preservation of landmarks, laid Bigelow carpets in the Old South Church, in Trinity Church, the Court House, and the State House. And in Washington, the government ordered Bigelow carpets and rugs for the Capitol, the Senate Chamber, the House of Representatives, the White House, and the offices of the Departments of the Treasury, the Interior, War, the Navy, State, and Agriculture.

Throughout the country, literally from coast to coast, from the Poland Springs Hotel in Maine to the Ponce de Leon in St. Augustine, from the First Church of Christ, Scientist, in Boston, to the Jonathan Club in Los Angeles, a magic fabric linked together churches, hotels, clubs, and private houses, the resorts of the plutocrats and the simple dwellings of Nebraska farmers, the temples of the godly and the theatres and restaurants of the carefree; governmental offices, department stores, opera houses, and even the unpassed third-floor back—a fabric of rare beauty and utility—Bigelow carpets.

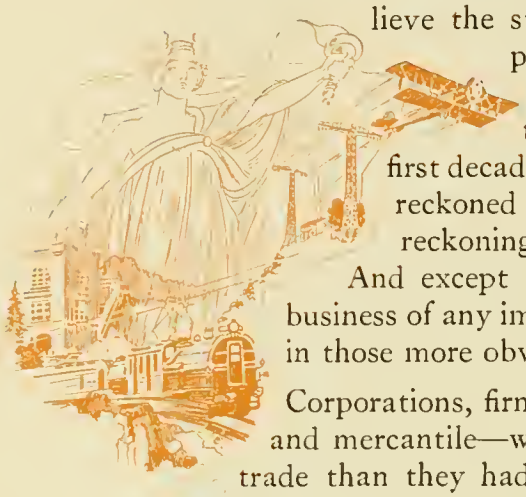
Chapter Five

The HARTFORD CARPET CORPORATION *(1901)*

LIKE the Bigelow Carpet Company, the Hartford Carpet Corporation was the result of the union of different streams of industry, in this case, of two main currents and a side current. The Hartford Carpet Company located at Thompsonville, known originally as the Hartford Manufacturing Company, and the New York business of the E. S. Higgins Carpet Company, were the two main sources. The Tariff Manufacturing Company at Tariffville was the adopted stepchild.

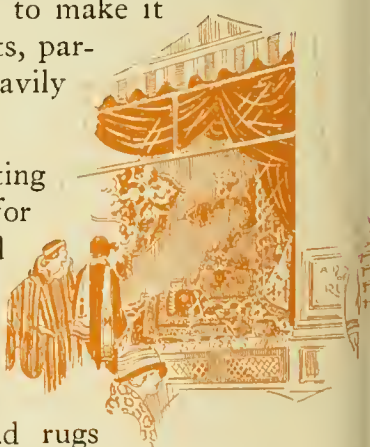
On February 25, 1901, the plant, stock, and business of the E. S. Higgins Carpet Company and the land, buildings, plant, stock, and business of the Hartford Carpet Company were transferred to a new corporation organized for the purpose and called the Hartford Carpet Corporation (of Connecticut). Robert P. Perkins was elected president, George Roberts, vice-president, George E. Perkins, treasurer, and George S. Squire, secretary. Alvin D. Higgins was made agent of the carpet mills at Thompsonville. Much of the machinery of the E. S. Higgins Carpet Company was moved from its plant in West 43rd Street, New York City, to Thompsonville, Conn.

A well-known statistician is responsible for the statement that "as much wealth was created in the United States between 1900 and 1920 as in all the time from the landing of the Pilgrims up to 1900." He goes on to state that he refers to wealth not merely as available cash, but also as the ability to satisfy human wants.

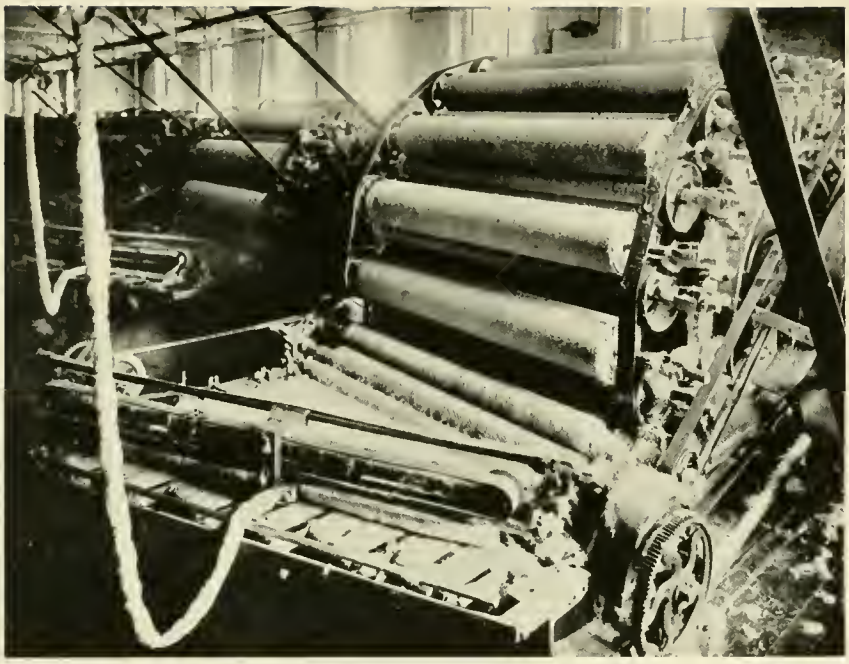


Looking back at the period referred to, it is not difficult to believe the statement entirely accurate. Tremendous productive forces and new energies have been released since the dawn of the twentieth century—many of them in the first decade and a half. Business that in earlier years reckoned its volume in hundreds now found itself reckoning in thousands; thousands grew to millions. And except for the lean year of 1907, almost every business of any importance revealed a steady annual increase in those more obvious evidences of prosperity.

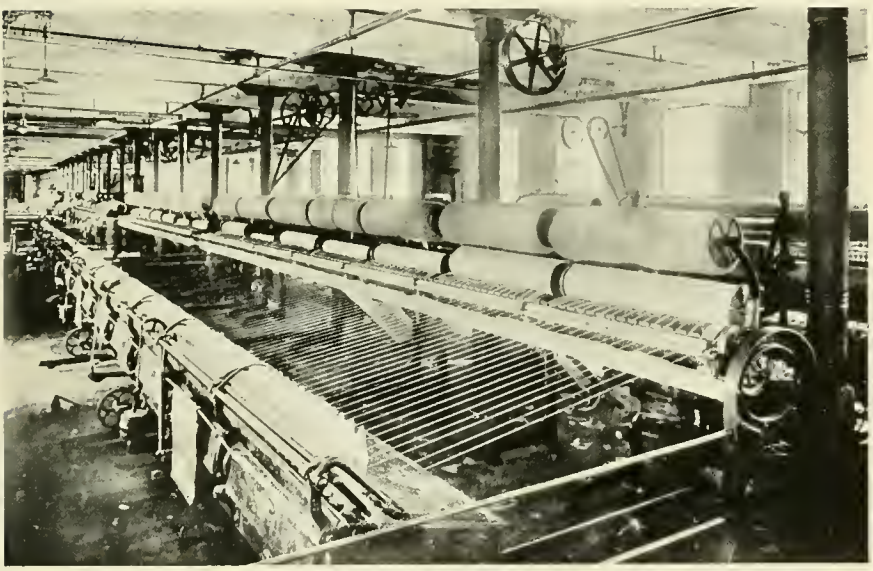
Corporations, firms, and individuals—industrial enterprises and mercantile—were enjoying a more active and profitable trade than they had ever hoped to attain. And the returns were finding their way, in part, into the hands of everyone connected with the businesses. An almost fabulous purchasing power was being built up in America. The then new art of advertising was beginning to attain its full stature, disseminating the attractions of fine clothing, furniture, rugs, pianos, phonographs, automobiles—what not?—to the remotest corners of the country. Desire for these better things was created, and in those who had the means with which to buy. The rise of the department store, the installment plan, and all those other retail devices designed to make it easier and easier for people to satisfy their wants, particularly marked this period and contributed heavily to the amount of business being done.



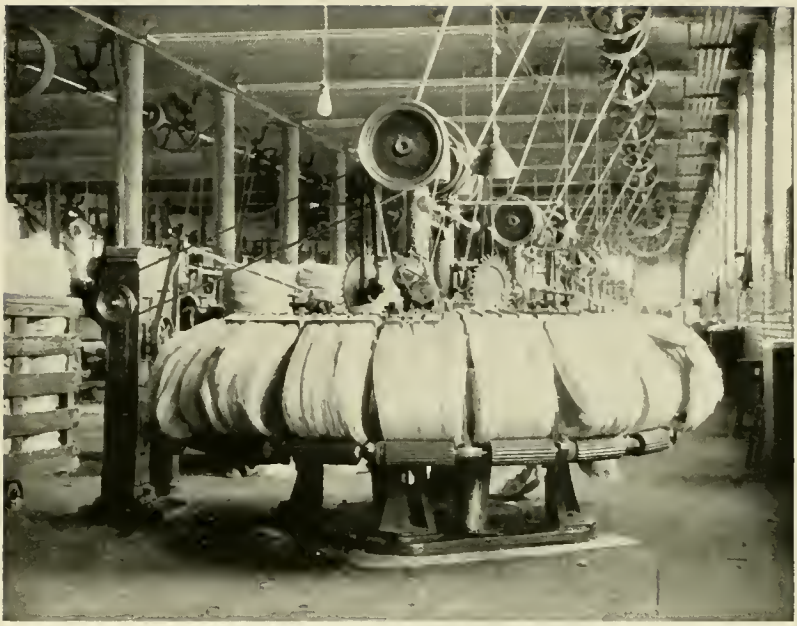
With so virile a consumer demand permeating the nation, it was a period of real promise for capable manufacturers. The newly organized Hartford Carpet Corporation was quick to grasp the trend of the times and to sense its opportunity. Everywhere in America the standards of living were rising. One of the primary demands of the family circle was for good carpets and rugs underfoot. The old rag carpets had served their purpose, but they must now give way before progress. Even the Ingrains which



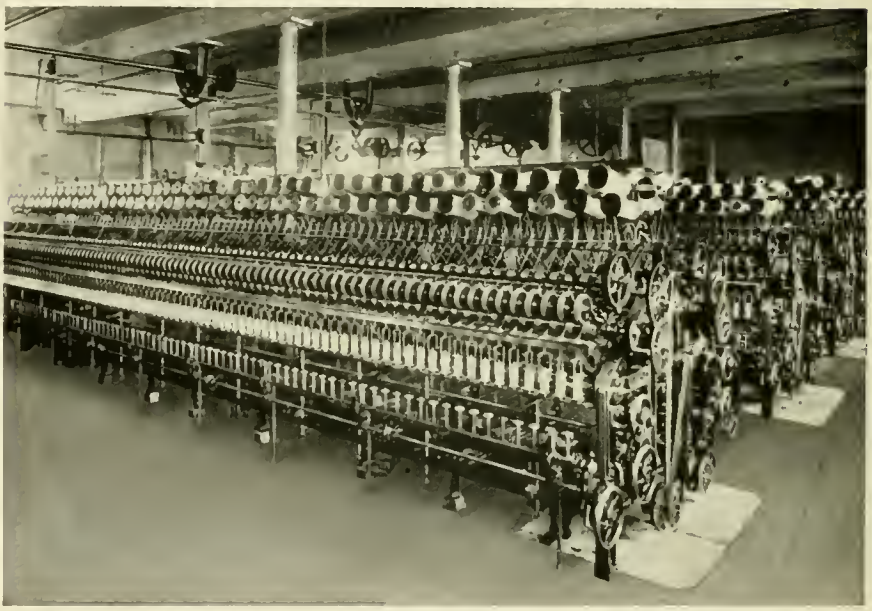
A part of a carding machine, showing the first process, where the wool fibres are straightened out.



Spinning mules on which wool yarn is spun. Several feet of roving are drawn out at a time, rapidly spun, and then wound on spindles, in forms known as "cops."



Circular combing machine, which combs out the longer fibres of wool from the sborter. The strand of long fibres which emerges from the machine is called "top," and is drawn out and spun into worsted yarn.



Spinning frames in the worsted department of a Bigelow-Hartford mill. An indication of the excellent lighting conditions is had from the fact that both pictures on this page were made without the use of any artificial light whatever.

had graced the "best" rooms were torn up and relegated to the "spare." Wiltons, Axminsters, Velvets, Body Brussels, and Tapestries—made up into symmetrical, room-size patterns—bright, attractive, and, above all, bespeaking that heightened taste which America felt sure it had acquired—these became household words and household necessities.

The Hartford Carpet Corporation could make excellent carpets and rugs, and, moreover, because of its highly developed and efficient manufacturing processes, it did make them in vast quantities, at prices entirely agreeable to the "mass" market. The result was that this corporation soon came to be one of the greatest producers of popular priced floor fabrics in the United States.

In 1905 a new Tapestry Mill was erected, 900 feet long, this immense unit being required to keep pace with the demand for Tapestry and Velvet goods. In 1911 was built a large new Axminster Mill, which for over a decade stood as one of the most extensive of its kind in New England.

Other developments took place steadily in the plant and equipment, the managers working always with a view to attaining the utmost efficiency of production and making the Thompsonville plant in every way complete and compact.

For a while after the organization of the Hartford Carpet Corporation, Ingrains were still in demand. But the demand was a rapidly diminishing one, and in a very few years the Ingrain looms were all scrapped to make way for the more modern successors.

Sometime previous to 1901, when the old Hartford Carpet Company was reorganized to become the Hartford Carpet Corporation, there had been originated at the Thompsonville Mills a wonderful new type of Wilton fabric, of five-frame structure, with a luxurious, high wool pile. It was called "Hartford-Saxony."

The Hartford Carpet Corporation went steadily forward with the development and perfection of this fabric, the aim being to make of it the ultimate of machine-made carpets in beauty, wearing

qualities, and durability—the last word in both artistic and structural characteristics.

How well they succeeded needs no recital at this point. To the carpet trade the name "Hartford-Saxony" has long been a talisman that calls to mind the finest of modern carpet loom products. Among hotels and theatres throughout the country, "Hartford-Saxony" has won a unique and enviable position, and private users for a score of years have found their "Hartford-Saxony" rugs an unfailing and untiring source of pride.

Some of the first to recognize the superiority of "Hartford-Saxony" carpets and rugs and adopt them for that exacting service which any floor fabric must withstand in a public or semi-public place were: the famous old Fifth Avenue Hotel in New York City, Hotel La Salle in Chicago, the Garden City Hotel in Garden City, L. I., Hotel Kimball in Springfield, Mass., and the Emma Willard School in Troy, N. Y. It is interesting to note that hundreds of these "Hartford-Saxony" rugs which went into the hardest kind of service ten to twenty years ago are to-day in excellent condition.

Thus through its noteworthy contribution to American industrial expansion during the early years of the twentieth century, its happy fulfillment of an essential need of the American people for good floor fabrics at popular prices, and its development of the "Hartford-Saxony," the Hartford Carpet Corporation was truly a maker of carpet and rug history throughout those busy years from its organization in 1901 to its merger with the Bigelow Carpet Company in 1914 to form the present Bigelow-Hartford Carpet Company.

Chapter Six

The BIGELOW-HARTFORD CARPET COMPANY

(1914)

IN 1914 the Bigelow Carpet Company and the Hartford Carpet Corporation consolidated, forming the Bigelow-Hartford Carpet Company.

The little streams that started back in the early part of the nineteenth century had grown and joined, and joined and grown, until before 1914 there were two main currents.

The first mill, the Medway Mill owned by Alexander Wright, was founded in 1825, later becoming the Lowell branch which followed its own course for over seventy years, finally to merge with the Clinton branch. The Thompsonville and New York factors, augmented by the Tariffville Mills, ran alongside each other for sixty years or so, and then united as a major unit in 1901.

Finally, in 1914, these two strong organizations united to form one of the most noteworthy carpet and rug manufacturing enterprises the trade has ever known. The officers chosen for the new Company were: Robert P. Perkins, president; Alvin D. Higgins, vice-president; George E. Perkins, treasurer; and George S. Squire, secretary. Alvin D. Higgins died in 1916. On September 16, 1917, occurred the death of George E. Perkins. He was succeeded by Frank H. Deknatel, who continues to fill the position of treasurer.

The Bigelow-Hartford Carpet Company from the very beginning of its corporate history has been the largest producer of high quality carpets and rugs in America, if not in the entire world. It is the inevitable outcome of bringing together for one unified purpose the

experience, skill, efficiency, and productive capacity summed up in the two component factors of the combination.

From the outset of the consolidation of these two giants in the floor covering industry, the ideal of the management has been not only to maintain the former high standards, but also to strive consistently for an improvement in the fabrics wherever possible. Wide looms for both Jacquard and Axminster fabrics have been installed, permitting of the finest seamless construction up to nine and twelve feet in width. "Hartford-Saxony" carpets and rugs have been brought to the highest possible degree of excellence. New mills and dyehouses have been built, in conformance with the best modern principles of industrial construction. And in every department an untiring effort has been put forth to make the Bigelow-Hartford Carpet Company and its products eminently worthy of the splendid traditions which are theirs.

For a very tangible evidence of the position the Bigelow-Hartford Carpet Company has won for itself in the carpet and rug trade, one has but to turn to the nation's fine hotels, whose floor covering requirements are necessarily most exacting in matters of beauty and serviceability. Here one finds Bigelow-Hartford products pre-eminent, hundreds of the leading hotels from coast to coast using them, in many instances exclusively, because they represent the best the market affords.

The conspicuous success of any industrial enterprise is seldom a matter of chance, but is usually directly traceable to the abilities and talents of one or two individuals in charge of its affairs. The Bigelow-Hartford Carpet Company is no exception. From the moment of its organization in 1914 it has been particularly favored in its directing heads: Robert P. Perkins and John F. Norman.

In the preceding chapter we mentioned Mr. Perkins' connection as an officer with the E. S. Higgins Carpet Company and the Hartford Carpet Corporation. He was president of the latter when the union between it and the Bigelow Carpet Company was effected; indeed, it was he who actually brought about the combination. It was but

logical, then, that he should become president of the new Bigelow-Hartford Carpet Company. From the beginning he gave his rare business ability over without reserve to the affairs of the Company, and continued as president until his death, April 28, 1924.

Mr. Perkins confined his business efforts largely to the carpet industry, having but one or two outside connections. He was for several years a director of the Union Trust Company of Springfield, Mass., and at the time of his death was a director of the National Park Bank of New York and president of the Neurological Institute of New York. The only event during his life that drew him away from his immediate business affairs was the World War, when he served as head of the United States Red Cross Commission to Italy, entering into that patriotic work with the same energy and spirit that characterized his attitude toward industrial and mercantile pursuits.

Aptly called a "conspicuous and outstanding figure" in the carpet trade, Mr. Perkins was in every sense a representative head of a representative organization. And, on the other hand, he was fortunate in having able associates to collaborate with him in furthering the interests of the Bigelow-Hartford Carpet Company, outstanding among these being John F. Norman.

Mr. Norman entered the employ of the E. S. Higgins Carpet Company as salesman in the Chicago office in 1894. Nine years later he was placed in charge of that company's Ingrain lines in New York, and given supervision over originating its lines of Tapestry and Velvet carpets. Success marked his efforts from the very beginning. It was Mr. Norman who, in 1907, originated the idea of a manufacturers' catalog of color plates, thus eliminating the cumbersome and costly practice of a salesman's having to carry with him literally a wagon-load of rug and carpet samples.

From the E. S. Higgins Carpet Company, Mr. Norman continued successively with the Hartford Carpet Corporation and the Bigelow-Hartford Carpet Company. Before the merger, in 1914, he had been sales manager of the Hartford Carpet Corporation, and was appointed

to the same position in the new organization. His complete success in that field led to his subsequent choice as general manager, later still as vice-president and member of the board of directors and executive committee. On July 16, 1924, he was elected president to succeed the late Mr. Perkins.

During the war period, while Mr. Perkins was absent on Red Cross service, the entire managerial responsibility of the Bigelow-Hartford Carpet Company devolved upon Mr. Norman, and to him credit is due for the manner in which this Company acquitted itself during this time of patriotic and industrial trial.

War Service of the Bigelow-Hartford Carpet Company

When the United States entered the World War in April, 1917, the burden of vast responsibilities was suddenly laid upon the industries of the country. One of the most important needs of the moment was for wool and cotton fabrics for the soldiers. Blankets and uniforms were required at once, and cotton duck was called for in enormous quantities.

The Bigelow-Hartford Carpet Company recognized its responsibility and advised the United States Government at the very outset that any machinery or equipment owned by the mills that could be converted for war purposes was at the disposal of the country.

The offer was immediately accepted, and with incredible speed the broad Tapestry looms were changed to manufacture blankets, and the regular width Tapestry and Brussels looms were adapted to manufacture cotton duck. More than 400,000 yards of cotton duck of different weights were woven by the Company during this period. Over 80,000 wool and wool-and-cotton blankets were manufactured before the armistice.

The Clinton Mill accepted and executed many contracts with government sub-contractors for the spinning of worsted and woolen

yarns, and the Thompsonville Mill spun large quantities of woolen yarn for the American Red Cross, to be used principally as sweater material. More than 4,000,000 pounds of worsted yarn, worsted top, and woolen yarn were produced at these mills for manufacture in other plants, and about 100,000 pounds of raw wool were scoured for similar purposes.

These few figures give a conception of the Company's willingness and ability to undertake and execute large emergency orders. The Bigelow-Hartford Carpet Company is justly proud of its war record, —one of the many patriotic industries of the United States that gave themselves whole-heartedly to the country in its time of need, without hesitation and without counting the cost.

The Mills

The mills of the Bigelow-Hartford Carpet Company are located at Thompsonville, Conn., and Clinton, Mass.

The mill at Lowell, which had been a unit of the old Bigelow Carpet Company, was leased to the United States Government during the war for the use of the U. S. Cartridge Co. for making small arms and ammunition. In 1920 the entire plant, including the cotton spinning machinery, was sold. The carpet looms and other machinery were moved to Thompsonville and Clinton.

Without attempting to describe the mills in detail, for this would be of interest only to construction engineers or mill men, we can perhaps convey an idea of their tremendous manufacturing capacity by the following brief statistics:

The combined annual production capacity of the two great Bigelow-Hartford plants at Thompsonville, Conn., and Clinton, Mass., is over 12,500,000 yards of carpets and rugs—basing measurements upon standard 27-inch goods.

The combined floor space is over 2,830,000 square feet—or about 65 acres.

Approximately 5,700 persons are employed in the two plants.

The Products

It is difficult, indeed, to picture in the abstract this total annual capacity of 12,500,000 yards, so let us look at it in another way. Should the President of the United States travel from Washington to San Francisco and back again to the White House, the Bigelow-Hartford Carpet Company's annual production would carpet the way, some 6,000 miles, and leave a surplus sufficient to extend from the White House to Florida. And such a pathway it would form!—"Hartford-Saxony," Bigelow-Lowell Wilton, Bigelow Axminsters, Hartford Bussorah Axminsters, and a host of other grades, luxurious and beautiful.

In rugs the Bigelow-Hartford line comprises six different grades of Wilton, one of Body Brussels, six of Axminster, one of Velvet, and two of Tapestry. In plain carpets there are four different grades of Wilton, four of Axminster, seven of Velvet, and one of Tapestry. In pattern carpets there are eight different grades of Wilton, one of Body Brussels and eight of Axminster.

The very magnitude of the plants which manufacture these many grades is in itself a tribute to the quality of the goods, for only through a constant and faithful adherence to the highest standards of manufacture is it possible to develop and maintain successfully a production equipment of this enormous size.

Convenient Offices and Salesrooms

In addition to the main office and salesrooms of the Bigelow-Hartford Carpet Company, located at 385 Madison Avenue, New York, branch offices and salesrooms are maintained in Chicago, Boston, Philadelphia, Detroit, Atlanta, San Francisco, and Los Angeles. These enable the main office to keep closely in touch with the various sections of the country, and give customers convenient access to the service of the Company.

The New York Office, occupied in 1923, is at the corner of Madison Avenue and Forty-Seventh Street, and includes the ninth and tenth floors of a new and very large, modern office building. The floor

Robert P. Perkins
First President
of the Bigelow-Hartford Carpet Company
1914 — 1924

Above
A characteristic corner of the New York salesrooms of the Bigelow-Hartford Carpet Company, showing the display racks for rugs.

Left — Modern conveniences in display match modern methods of manufacture in the operation of the Bigelow-Hartford Carpet Company.

A commodious separate department in the Bigelow-Hartford New York salesrooms is given over to the display of the various grades of carpets manufactured by the Company. The Contract Department room for display of carpets and rugs for hotels, theatres, stores, etc., is located beyond the carpet room, through the door at the right.

space totals 43,000 square feet, giving the most commodious quarters that could be desired for the purpose.

The entire tenth floor is carpeted with Bigelow-Lowell Wilton in neutral gray, 3,300 yards of this carpet being used for the work. This floor is devoted to the rug and carpet showrooms and the executive offices.

The ninth floor contains the clerical business offices and the studios of the designing department.

There is magic in the tenth floor of this modern New York office building, the age-old, eternal magic to be found wherever beauty—true beauty, profound, thoughtful, and lasting—is created. The entire establishment is the epitome of modern business convenience, yet there lurks in the air a sense of romance older than fact. This is not the noisy, colorful market of the old world. Nor is it the customary harsh trading place of the new. This is the merchant-magician of the old-time fairy books and the Arabian Nights, who invites you to step from your little world into a newer and an older one. This is the spirit-kin of those ancients of the streets of Bagdad who cried, "I'll show you my wares," and "New lamps for old."

You wish to see the far places of the East? Here is a rug that depicts the spirit of slow-moving races. Its blue is the blue of calm water and its shades of red those of the roses that trail over iron casements. It conveys the drowsy, spicy stupor of a Turkish afternoon.

And here is a rug reminiscent of the crude vitality of a nomad race roaming over the cold, bleak Caucasian lands. It sings of horses and victories, of home life found in the temporary camp. Its colors are vigorous, not glowing with the languor of Turkey.

Too harsh? Ah, well, each to his own—But here! Luminous blues and silky tans blended in the mysterious characters of China. And there is one with a suavity of design that could have its origin only in the "celestial isles" of Japan. Ancient, more ancient than history, but containing the very essence of civilization are these old

Chinese and Japanese designs woven into rich rugs and carpets on the Bigelow-Hartford looms.

Ah, you're restless in the East. Here, then, is such a rug as graced the boudoir of Marie Antoinette,—dainty, poised, but shallow under its air of sophistication. Beau Brummel and his "fat friend," George IV, might have strolled over this one with its gray scrolls on a black ground in all the voluptuous austerity of the Georgian period.

You may hear the child voices of singsong girls and the clang of temple bells; you may dip into the black romance of the Renaissance, or tread the stately ballrooms of an earlier England. Your mind may find repose in the soft or glowing colors of long strips of plain carpet, great ribbons of many a shade and texture.

The rugs move smoothly on their silent racks, carrying you with them. You are loath to leave this other world, and it is almost a shock to realize that you are still in the Bigelow-Hartford showrooms, ten floors above the twentieth century high tension of New York City. It is difficult to believe that this beauty is actual, that these rugs are woven on looms in New England. The murmuring voice of a merchant-magician from some ancient, half-forgotten tale haunts your ears, crying again in your memory, "Come, I'll show you my wares—."

Chapter Seven

CARPETS *and* RUGS *in the* MAKING

IT has often been stated that practically every article in a home has been sold to the owners; that is, some one, by personal argument or persuasion, has created a desire for it. On the other hand, there are some few articles that have become customary; they are taken for granted in every house, and too little attention is paid to them,—too few actual facts are known about them.

This is singularly true of rugs and carpets. How few men and women know anything—even broad principles—about the manufacture, the grades, and the types of the rugs that are under their feet! Little has been written about rugs and carpets and few are the people who are able to take a trip through a mill—even through another's eyes.

One of the first things not generally known by the layman is that it takes a very particular kind of wool to make a satisfactory carpet or rug. Good carpet wool must be lustrous and resilient, and the staple or fibre must be long enough for the making of worsted yarns where these are required. But most important of all, it must have the strength and durability to withstand the hard usage to which any floor covering is subjected. Wools differ in their qualities according not only to the breed of the sheep from which they are taken, but also according to the place in which the sheep are raised. It is easy to understand that nature goes a long way toward providing sheep with the sort of covering which will give the greatest protection against climatic hardships—and that the fleece of a sheep whose habitat is the warmer, temperate zones is likely to be quite different from that of one which must brave the rigorous weather conditions of the colder countries.

Thus, when a good carpet wool is required, combining several diversified qualities, it cannot be found in any single wool, but must be built up by a scientific mixture of wools from scattered sources. This is called the "wool mix," and is the first step in the making of carpets and rugs.

Passing through the Bigelow-Hartford wool storehouses, you see endless tiers of baled wool. The markings on these bales show that they have come from South America, China, and even from far-away India. Some of the wool is bagged, rather than baled, and the labels show that these are from Scotland. For some reason the Scotch wool raisers insist upon shipping in bags instead of bales.

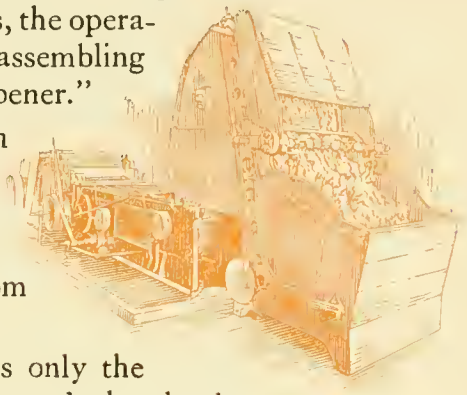
The wool from these various lands is not all of the same grade—far from it. For instance, from China alone come as many as thirty different grades. But the essential characteristics obtain throughout all the grades.

In the South American wools you find length and strength of fibre, together with a noticeable sheen or gloss. The Chinese wools are very firm and strong; just to run these raw wools through your fingers conveys the feeling of durability and long-wearing qualities. The wool from India is lofty and resilient; you step upon a tuft of it that has fallen to the floor and, as you raise your foot, you note how the fibres spring back up as though they were a bundle of hair-like silvery springs. But of the various types entering into the "wool mix," you are likely to find most amazing the Scotch wools,—long, graceful tufts, often measuring ten inches or more from hide to tip, and so strong that you must literally "lay hold" with both hands in order to break three or four of the fibres you have stranded together.

By this time you have perhaps asked (as most visitors at the Bigelow-Hartford mills do) why you have seen no American wool entering into the "wool mix." The answer is that American wools are not suited to carpet making; they are too fine and delicate, and do not attain the necessary length. Experiments have been repeatedly tried in America looking toward the development of breeds of sheep which would supply long, strong wool comparable, say, to that from Scotland. But in spite of our sheep-raising skill, in two or three seasons the wool had shortened to the typical American length and

had become too fine for so rugged a requirement as carpet making. Granted that a certain amount of carpet wool might be produced in America by the persistent blending of breeds and the periodic introduction of foreign blood into the flocks, yet such a procedure would be altogether too costly and impractical. This is one of the cases where Dame Nature *will* have her own way, in spite of man's best attempt to defeat her.

The "wool mix" is governed by a formula prepared by the wool expert at the carpet mills. He is apprised of the amount of yarn of specified type and weight required, and accordingly he prepares his formula of wools which must be mixed together to produce the desired qualities. The formula shows the kinds of wool (China, South America, Scotch, etc.), the respective grades, and the amount by weight in each case. Following these definite instructions, the operators in the wool house have little difficulty in assembling the component parts of the "mix" before the "opener."



The "opener" is a huge box-like machine which pulls apart the matted tufts of wool and at the same time beats out the loose dirt. Into this are fed simultaneously the several kinds of wool called for, thus insuring a proper blending from the start.

The beating of the wool in the "opener" is only the beginning of the cleaning process, for there is a great deal to be done after the loose dirt has been removed. The wool is still full of grease and even of little chunks of animal fat.

The thorough cleansing of the wool at the Bigelow-Hartford mills is not only to insure perfect cleanliness, but also to render it capable of being dyed. It is an economic matter, for greasy wool will not take the dye evenly. If cleansing has not been perfectly performed before the wool reaches the spinning and dyeing processes, it is impossible at those stages to obtain a satisfactory result. For that reason, the motto of the wool house is "get out the dirt."

From the "opener" the wool passes through an automatic feeder into the first of three scouring baths. It is poked into the boiling water by a rake-like agitator, and after being worked around in the

soapy solution, it gradually comes to a wringer which forces out the liquid. Upon the journal of this wringer there is exerted a pressure of 1000 lbs.

Passing the first wringer, the wool drops into another tub and practically repeats its experience of the last, except that a wringer exercising a force of 1500 lbs. is waiting for it at the exit from this tub. But the end is not even yet.

Into the third tub the wool is precipitated, and finally it works its way out through clear, pure rinsing water to a wringer which exerts no less than 1800 lbs. of pressure between the rollers. Through the original beating and three successive tubbings, the wool has now taken on quite a different appearance from that shown as it entered the "opener."

From the last wringer, the wool is passed automatically into a huge drying machine, from which it emerges clean, well-mixed, and bone-dry, onto a cleated conveyor (much resembling a miniature moving stairway) which carries it up to temporary storage bins on the top floor.

These machines we have just been watching—the "scourers," as they are called by the operators—are 80 to 85 feet long from the lip of the "opener" to the ejector of the dryer. And while they consist of a half-dozen odd units, yet they are so ingeniously and compactly assembled that they give the appearance of a single device.

One of these "scourers" has a capacity of around 1000 lbs. an hour of clean, dry wool, and in view of the fact that the Bigelow-Hartford Carpet Company operates a total of twelve "scourers" in its two mills at Thompsonville, Conn., and Clinton, Mass., you can begin to understand the tremendous scale on which its manufacturing is conducted. Notwithstanding the many operations we have already mentioned, the wool has never been touched by human hands since it was originally fed into the "opener,"—a typical instance of the modern, labor-saving devices everywhere utilized by the Company.

After the scouring processes, the wool is, of course, still in the raw stage, with a long distance yet to go before it becomes a carpet or a rug. It has come from the "scourer" a mass of fluffy, tangled fibres, which must be spun into yarn.

But before the wool can be delivered to the worsted mill or filling mill from the wool house, it must be opened out and the whole length brought into a uniformly free and loose condition. This is accomplished by passing the wool through a machine known as a picker, which consists of a large spiked drum and three small spiked cylinders mounted in an enclosed frame. The drum rotates at high speed and the cylinders revolve more slowly in a contrary direction, their teeth just clearing those of the drum.

The picker reduces the matted wool passing between the drum and the cylinders to the consistency of cotton batting—light, free, and disentangled.

In going through the picker, the wool passes under the oiler.

It seems somewhat curious, naturally, that after time, energy, and money have been spent in scouring the wool free from oil, more oil should be put back into it. But this oil is of a different sort and prepares the wool for spinning. For this oiling the Bigelow-Hartford mills use the highest grade of lard oil emulsion.

The wool is now ready to leave the wool house and be spun into yarn. It is interesting to note that it probably takes longer for us to speak of this step than for the wool to make the trip, for the means of locomotion is by air blast through large conveying tubes. The air blast drives the wool, swift as an arrow, through the pipes, and delivers it respectively at the filling (wool) mill and the worsted mill. As the wool shoots out of the conveyors into the receiving bins, it seems more like a violent, primitive snowstorm than a step in a modern manufacturing process.

Two kinds of surface or figuring yarn are required in the manufacture of Bigelow-Hartford products,—worsted and wool. Worsted is the brilliant, lustrous yarn, whose chief characteristic is that it is spun from long fibres previously worked into parallel positions. Wool, on the other hand, is a bulkier, less brilliant yarn, spun from shorter fibres, and achieving its sturdy durability because the fibres have been permitted to lie in all directions, merging and interlocking, and thus exercising their natural felting or clinging properties.

Wool yarn is of greater antiquity than worsted, but since its manufacture is less complicated than the latter, let us look for a

moment at the making of worsted and, by gaining some familiarity with the various processes, we will find the making of wool yarn considerably easier to understand.

Worsted

When the clean raw wool has arrived at the worsted mill through the conveyor pipes, it is fed into the carding machines.

Carding is an operation designed to open out the fibres in the wool. Worsted carding not only separates the fibres, but also keeps them as closely parallel as possible.

The worsted carding machine is too intricate to treat in detail at this point, but it might be briefly described as a series of cylindrical rollers, of different sizes, revolving in the same direction but at varying speeds, each studded with heavy metallic teeth. When the wool has run its dizzy course through the carder, it emerges a thick, untwisted, filmy rope, called sliver.

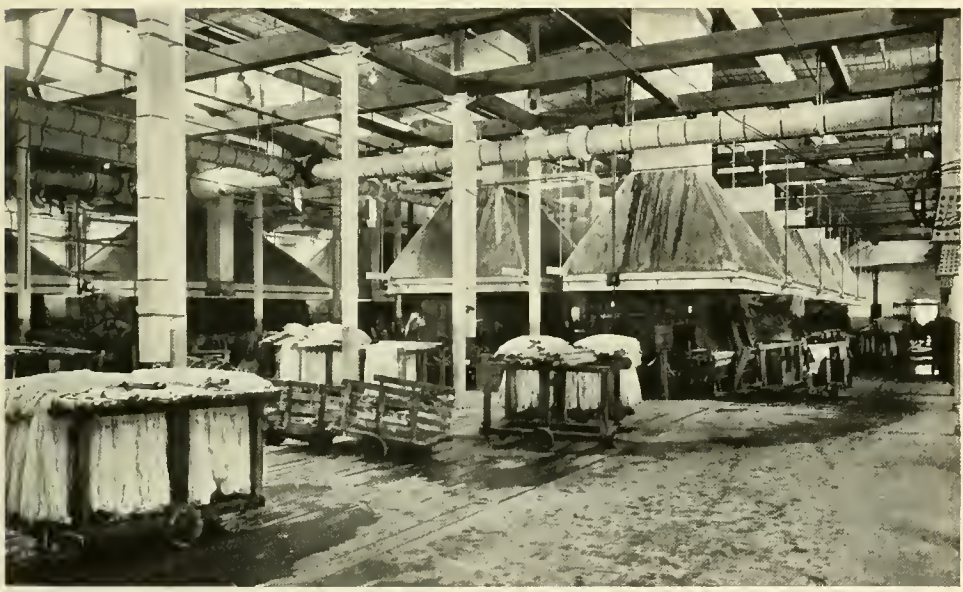
Next the sliver is fed through a series of gill boxes—as the first of a long series of drawing operations—several sliver ends being combined into one and drawn out until the resulting end has about the same diameter as the single ones fed into the machine. The principle of the gill box is comparatively simple. The sliver ends enter between rollers revolving at a moderate speed, and are flattened out over the faller, which is simply a cylinder armed with very close wire teeth. The sheet of wool is drawn, as it emerges, between a final pair of swiftly revolving rollers. This sheet is now passed through a sort of funnel and is wound into large balls as it comes from the balling machine.

And now comes the step which reduces the wool to its real worsted basis,—combing. The comber is at least one machine in the worsted mill which through its name can convey to the layman an idea of its function. It does just what the word implies—combs out the short fibres, known as "noils," and produces what is known as "top," a continuous untwisted strand of long wool fibres made parallel by the action of the machine.

In the Bigelow-Hartford mills the circular type of comb is employed, and its operation never fails to arouse interested comment from visitors; the common remark is that the device seems "almost

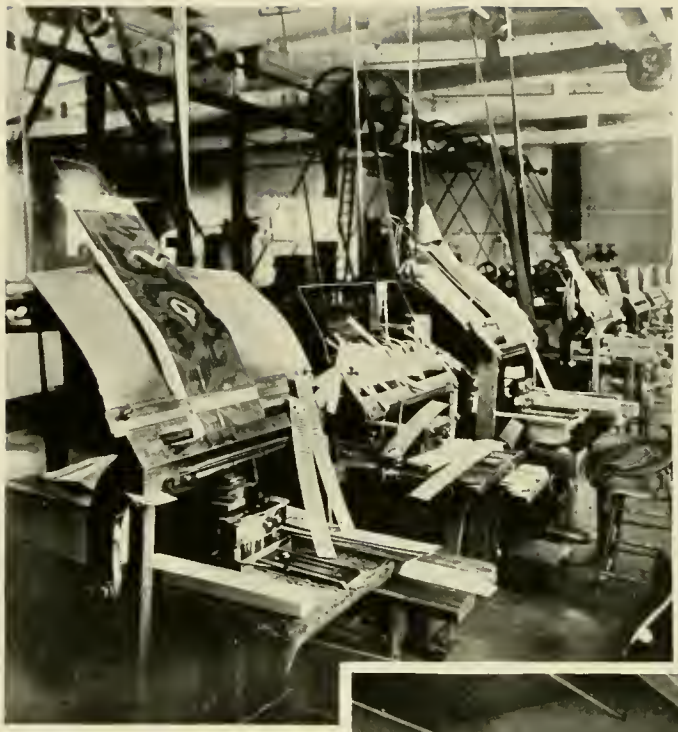
YARN SCOURING ROOM

Before it is dyed, yarn must be thoroughly scoured to remove all traces of the oil introduced to facilitate spinning.



BIGELOW-HARTFORD DYEHOUSE

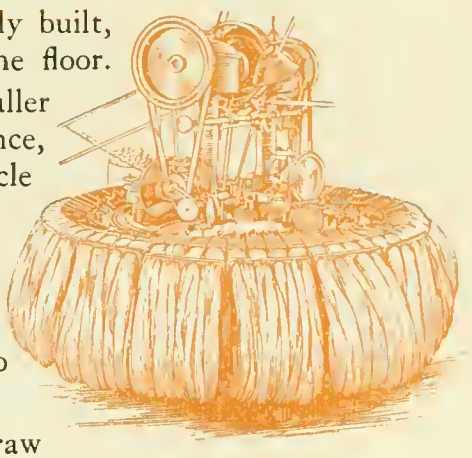
Each of these machines can dye 1000 pounds of yarn at one time. Through modern hood ventilation, the room is kept free from steam and vapors.



JACQUARD CARD-CUTTING DEPARTMENT
The carpet design is painted upon paper ruled into small "checks," each representing a tuft of wool. With the machines shown here, skilled operators then translate the color-rows in the design to perforated cards, by means of which the Jacquard loom harness is controlled.

THE COLORISTS' ROOM
When the artist's design reaches the colorist, the latter matches each and every shade from his racks of colored yarn. In the Axminster rack are 2400 "standard" colors, and in the Wilton, 2000; all these "standard" colors are numbered and recorded in such a way that no confusion or error can result when the colorist's specifications are subsequently sent to the dyers.

human." The combing machines are compactly built, rising to a height of about three feet from the floor.



Briefly, the construction consists of two smaller comb-toothed circles inside the main circumference, also comb-toothed, and tangent to the outer circle at opposite points of its diameter, all rotating in the same direction. Seventy-two ends, as drawn down in the gilling, are automatically fed from the outside onto the tangental points, and pushed down between the points of the two circular combs.

The circles, in revolving, continuously draw apart, leaving the long fibres protruding from the inner edge of the outer circle and the outer edge of the inner circles. Vertical rollers grip these fibres, and knives lift the wool off the teeth of the combs. Thus there are two ribbons of combed fibres issuing from the outer and one from each of the inner circles. These four are automatically condensed into a single, lustrous, even band which coils itself into a revolving can.

The noils left from the combing operation are disposed of for the making of wool or short fibred yarns.

The ends, or tops, as they come from the combs are now put through a series of gill boxes, receiving en route an additional oiling, and through drawing machines. In this drawing process, six operations are included, each condensing several of the bulky strands into one, and each producing a strand slightly finer than its predecessors. The drawing and spinning of worsted are indeed object lessons in patience; beautiful, strong yarn is the ultimate result, but it must be accomplished little by little, never being subjected to overstrain in the drawing, for this would result in instant breakage. Inch by inch the diminishing strands must be drawn out—again and again and again. Finally, when the strand is sufficiently drawn down, it is ready for spinning.

On the spinning frames the yarn (for the strands are now beginning to show some evidence of becoming yarn) is unwound from spools on which it has been reeled, through the usual two rollers going at

different speeds and thus continuing the attenuating process, onto revolving spindles. The spindles are revolving in a different direction from the spools, thus imparting a twist to the yarn. Of course, regulation is maintained over the amount of both twist and tension, thus establishing the quality or grade of the single strand spun worsted that is produced.

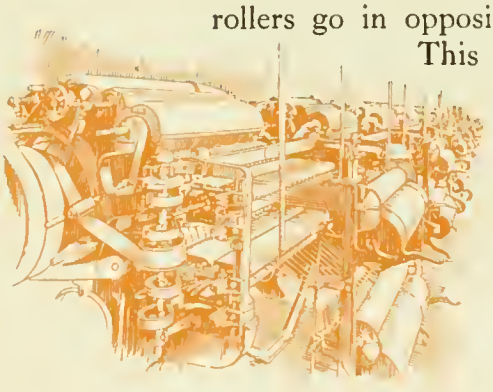
The process following the spinning is called "twisting," really nothing more than an auxiliary to the former. The single spun worsted, as it comes off the spindle, lacks the body and strength necessary for a satisfactory carpet worsted, so two of these strands are twisted into one. Three strands of twisted yarn are folded or doubled into one to produce the three-ply grade of yarn used for very high quality goods.

The worsted yarn which we have followed through its evolution from raw wool is now reeled into skeins ready for dyeing. Before proceeding further, however, let us retrace our steps for a moment and look at the making of wool yarn.

Wool

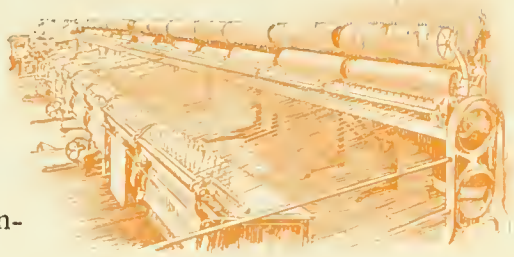
As we have seen, the object of the worsted mill is to sort out the long fibres, straighten them out in parallel positions, and spin and twist them into a strong lustrous yarn. The object of the filling mill (this name is commonly used to designate the wool spinning department) is the direct antithesis; here the fibres are to be as thoroughly mixed as possible, so they will exercise their natural felting properties, and eventually spin into a durable furry type of yarn.

In the filling mill the raw wool is first put through a carding machine, similar to that used in making worsted, except that the rollers go in opposite directions instead of in the same direction. This thoroughly mixes up the fibres, and gives up the wool in the form of soft, flabby roving, for mule spinning.



There are now no extended drawing and combing processes as in the worsted mill. All that needs be done to make the carded wool

roving into wool yarn is to give it the proper amount of spinning and drawing. Both are accomplished at one operation in the spinning mules.



Mule spinning is an interesting if not almost amusing process for the layman to watch, for the machines seem very aptly named. While they are in a sense clumsy-looking devices, yet in reality they are about as ingenious as any mechanical device employed in the carpet making industry.

In a woolen mule the spools of roving are set in a fixed frame and the ends pass between a pair of rollers to the spindles. The latter stand, slightly inclined backwards, in a long row upon the movable carriage.

As the movement starts, the spindle tips are close to the rollers. The roving is paid out and at the same time the carriage holding the revolving spindles moves away from the rollers. No yarn is as yet wound on the bobbins, but the roving is being twisted. The rollers cease paying out roving, the carriage moves out a little further, and the spindles fly a little faster, thus twisting and stretching the yarn. When sufficient twist has been imparted, the carriage retraces its way back to the rollers, and at the same time the spindles wind the spun wool yarn onto the bobbins.

From the mule spinning there comes a single strand wool yarn, which is twisted with similar strands to form extra-ply yarn. Two strands twisted together constitute two-ply, three strands three-ply, and so on.

We have described in a fairly extensive way the making of worsted and wool yarn simply because these are the carpets in the "raw material" stage. The quality of the finished carpet or rug originates in the quality of the yarn entering into it, and it is a very difficult thing for a carpet manufacturer to maintain a high standard unless he makes his own yarns. Intentions may be unimpeachable, but if the yarns received at the factory are inferior in quality, or of poorly-cleansed, under-length or carelessly-spun wool, the manufactured goods cannot measure up to the traditional Bigelow-Hartford standard.

Design

The prime essential of a carpet or rug is beauty. True it is that the value of the fabric is judged by its inherent quality and its ability to endure hard service, but the impulse to purchase it comes first from a desire for its beauty as a decorative element. Its object is not only to render a softness to the tread, but also to impart to a room an atmosphere of warmth and welcome.

Hence, in the manufacture of a carpet or rug, the things which give beauty—the design and the coloring—are among the primary considerations. To produce anything one first must have a plan, and in carpet making the plan is the design.

This design is the work of an artist, but as it is to be a guide in controlling the various processes of manufacture, the artist must paint his picture so as to show the position and color of each individual tuft of wool as it appears in the finished fabric. These designs are made on a large sheet of paper specially ruled into little squares or oblongs, called "checks," each of which represents a tuft of wool in the fabric. In these checks the artist paints the colors that are to form his pattern.

Coloring

When the design is finished and approved, it is sent to the colorist, the man who selects the colors and shades of yarn that are to compose the pattern.

Standing easel-like before the colorist is a large rack containing hundreds of little clusters of yarn, each dyed in a different shade. Often the variation in hue between several of these little clusters will be scarcely perceptible to the untrained eye, but each really is slightly different from its neighbor and bears its individual color number.

In the coloring department of the Bigelow-Hartford Carpet Company there are two color racks: one for Wiltons, containing approximately 2000 standard colors; and one for Axminsters, containing about 2400. These 4400 samples are called "standard colors" because they are numbered in a systematic color record maintained jointly by the Company's colorists and dyers. Any one of the colors is

instantly recognizable by number, thus avoiding confusion or error. Skeins of yarn representing each number are filed away in a darkened room off the coloring department, in closed wooden tubes, from which fresh samples may be procured from time to time as they are needed. Through this painstaking, methodical system both colorists and dyers can do their respective work with assurance of correct results.

It is not to be implied that the possible colors are limited to the 4400 contained in the racks. Almost innumerable variations of the standard colors can be made where they are specially called for, lighter or darker, deeper or more transparent, as the case may be, thus actually extending without limit the possible color scope for carpet and rug making.

When the colorist has selected the colors that match perfectly the given design, he makes up a color specification sheet, giving the color numbers required and the amount and kind of yarn to be dyed in each case, which is forwarded to the dyehouse.

Dyeing

The worsted and wool yarns which we followed through the spinning come directly from their respective mills to the dyehouse, where they are first subjected to a vigorous bath in order to remove the oil which was put in to assist in the spinning. When the oil has been thoroughly washed out, the yarn is ready to be dyed in accordance with the colorists' directions. Each number on the specification sheet represents a fixed and properly recorded solution of dye liquor.

The yarn is suspended in large skeins from the horizontal rods of a big wheel. As the wheel slowly revolves, it is constantly dipping the skeins into the vats of dye liquor underneath. The dye liquor is kept hot by live steam.

The horizontal rods, from which the yarn hangs, turn with every movement of the wheel, thus preventing any streaky places where the strand touched its support.

Over the dye vats and wheels are huge metallic hoods which draw all escaping steam and fumes upward to outdoor ventilators.

In some colors the condensed steam from the power plant is used, but in others cold water is used and brought to a boiling point in order to make the colors absolutely fast. A modern machine will dye 1000 pounds of yarn at one time, whereas the earlier type could handle only 120 pounds at one time.

A comment seems in order at this point on the improved conditions in the modern dyehouse, such as those at the plants of the Bigelow-Hartford Carpet Company, as compared with the older dyehouses. The casual visitor at an old-style dyehouse, where the dye vats were open and without hoods to carry off the escaping steam, usually took away with him a disagreeable recollection of dense clouds of steam, dripping ceilings, water-soaked floors, and thick, dank air. But the same visitor looking in upon the up-to-date Bigelow-Hartford dyehouses to-day would witness a marvellous change. The floors and ceilings are dry, the air is clear, and the great hooded dye vats are reminiscent of rows of cooking ranges in the kitchen of a metropolitan hotel. No longer is an hour in the dyehouse sixty minutes of discomfort; rather it is an hour of very pleasant and instructive experience, watching the yarns take on their rich, varied colorings in these most modern of dyeing machines.

Now that the wool has gone through the different processes until it has become colored yarn, it is next wound onto spools ready for different looms making Wiltons, Brussels, Axminsters, and plain carpets.

Brussels

Of modern machine-made carpets, that which demands the first mention, because of its seniority, is the Brussels carpet, a loop-pile fabric consisting of a strong woven foundation composed of linen and cotton yarns, together with that portion of the worsted yarn which does not appear on the surface. The pattern itself is formed on the surface by differently colored looped threads of worsted yarn.

The character of Brussels lends itself to patterns well-defined in design and color. The smooth, gently-ribbed surface gives a clean

and neat effect, permitting definiteness and quiet brilliance. In regard to the cost of production, it is economical in the operation of yarn dyeing, but comparatively expensive in weaving as well as in the quality of figuring material used, in comparison with the actual amount displayed on the surface. It is, nevertheless, the best and most durable of the loop-pile class of carpets.

The "figuring threads" represent its chief feature; in the cheaper kinds they are made in three or four sets of colors only, but in the better grades they are made in sets of five or six colors. Each set is technically called a "frame." Even in five- and six-frame construction, sometimes small sections of additional colors are introduced at intervals across the width of the warp for the purpose of producing variety. These replace an equal number of any one or more sets of colors and the system is called "planting."

All the figures or pile threads are not displayed on the surface simultaneously—only so many as are equal to the number contained in one frame; but the colored threads are selected from one, more, or all of the frames in accordance with the colors required in the patterns. All the remaining pile threads are bound into the body of the texture until they are again required for figuring purposes. It is this factor which adds considerably to the expense in production; but, on the other hand, it increases the carpet's strength, depth, and resiliency.

It is from this fact, that in five-frame weaves only one-fifth of all the strands is on the surface, while four times as many strands are buried in the body of the carpet, giving an effect of thickness and adding to the life of the fabric, that the name, *body* Brussels, comes.

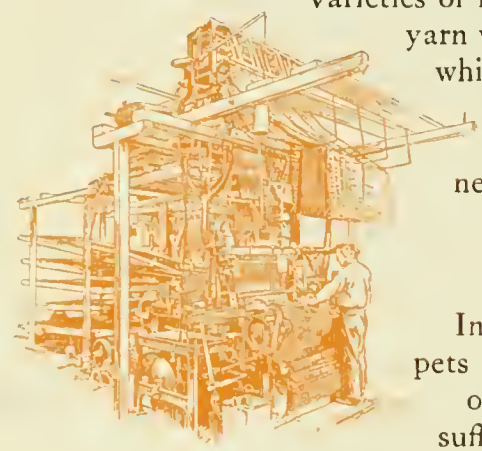
Wiltons

Wilton carpeting is similar in many respects to Brussels. The Jacquard loom is practically the same for both fabrics, convertible from one to the other without much difficulty or expense. The main difference lies in the fact that whereas in Brussels the surface is ribbed and composed of loops, in Wiltons the surface is tufted. The loops

of a Brussels carpet are formed over a slender metal rod known as "the wire," which is withdrawn, leaving the yarn intact. In a Wilton carpet the wire is equipped at the far end with a knife-like blade which, as it is drawn, cuts the loops, forming a thick, upstanding pile. The rod, too, is slightly larger, making the loops bigger and, when cut, the pile longer. The preparation of the yarns for the worsted pile, chain, stuffer, and weft, however, is substantially identical, and the weaving and finishing operations are much the same. In the mills both types thus come under the designation of Jacquard carpets.

Inasmuch as the loops are cut, they must be so bound down as to prevent the tufts from being easily pulled out or detached by wear and tear. In Brussels, where the loops remain uncut, there are two shots of weft to each wire.

In Wiltons of ordinary height of pile, there are usually three shots of weft to each row of pile, which makes a firmer fabric. This difference does not apply to all grades of Wilton, as there are some varieties of high pile Wiltons made of heavy, sharply twisted yarn which are woven with two shots of heavy weft and which possess exceptional wearing qualities. Generally speaking, Wiltons are woven closer, with more rows to the inch, than Brussels, which necessitates the use of thinner wires.

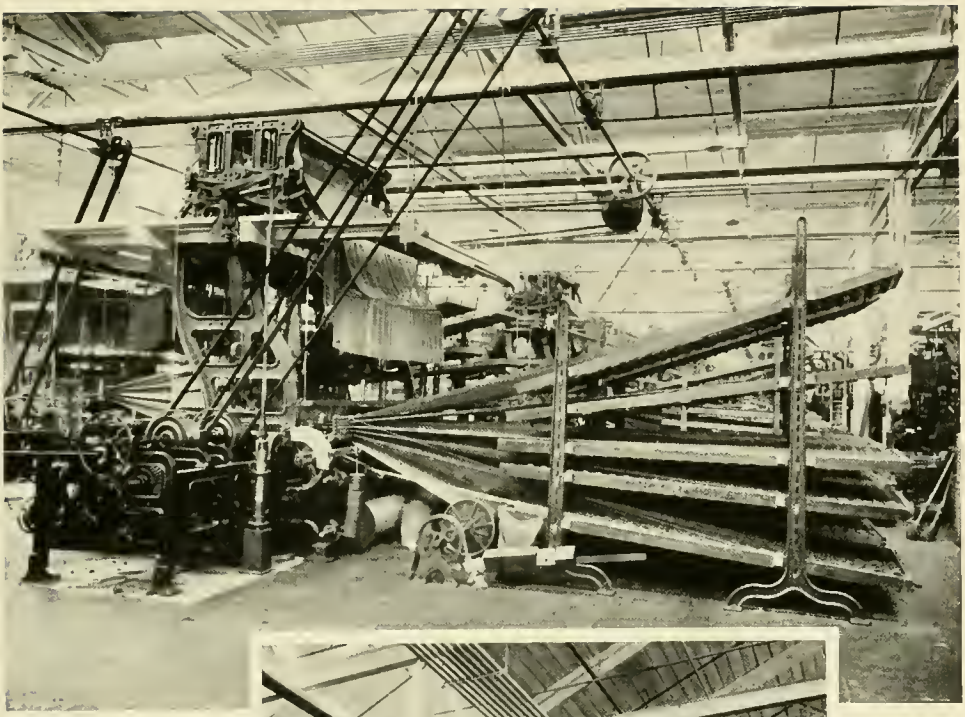


The Jacquard Carpet Loom

Inasmuch as the Brussels and Wilton types of carpets are in so many ways similar, a description of the operation of a typical five-frame Wilton loom will suffice for both.

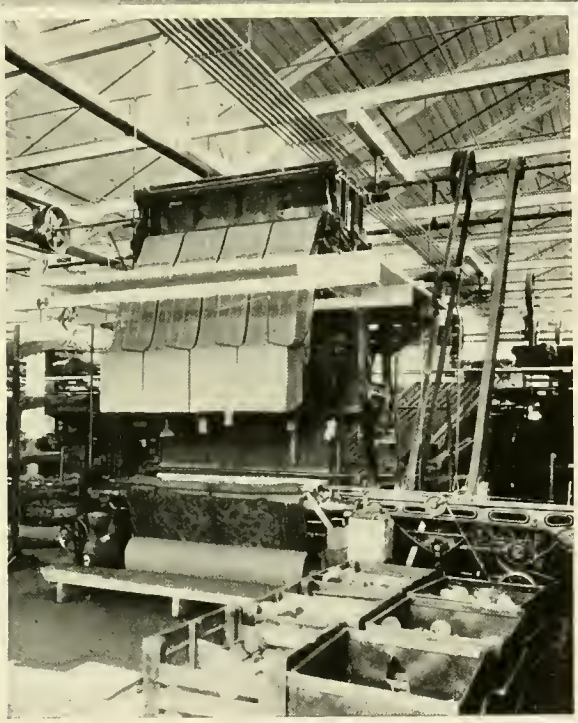
The Wilton loom has the Jacquard attachment overhead, and, at the rear, the five large racks or "frames" which hold the spools of yarn. From these five frames come what are practically five layers of woolen strands. As has been explained, four of these are bound into the body of the fabric.

As the strands of yarn from the spools pass forward through the loom to produce the fabric, some must be raised above the



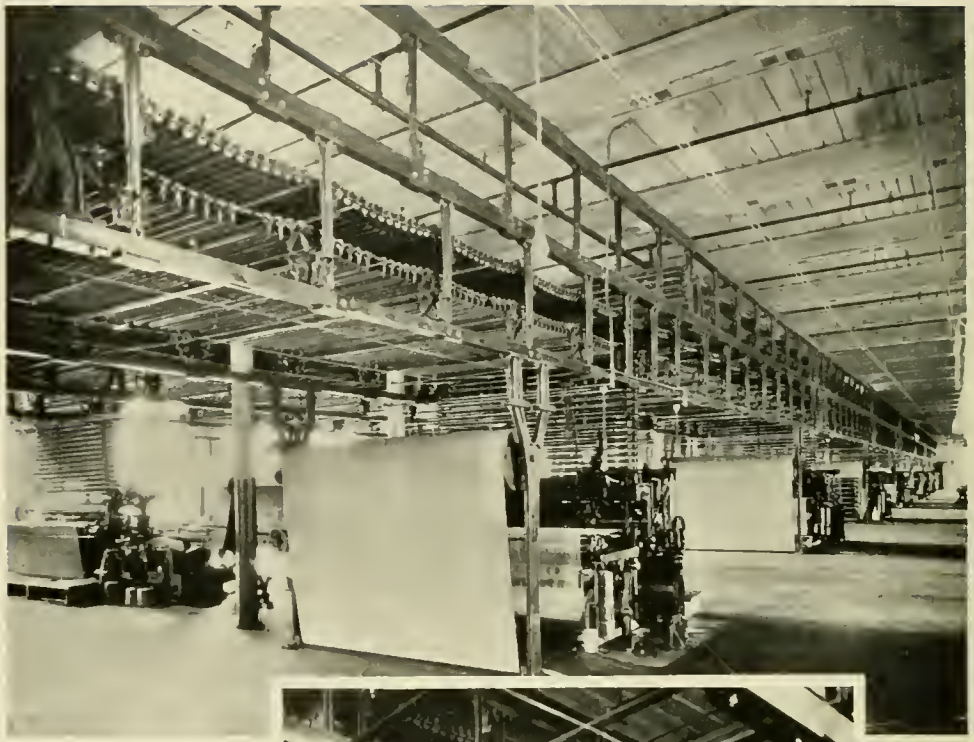
A TYPICAL FIVE-FRAME JACQUARD CARPET LOOM

weaving "Hartford-Saxony." The frames, or racks, at the right, hold the spools of colored yarn, paying the strands into the loom to form the pattern.



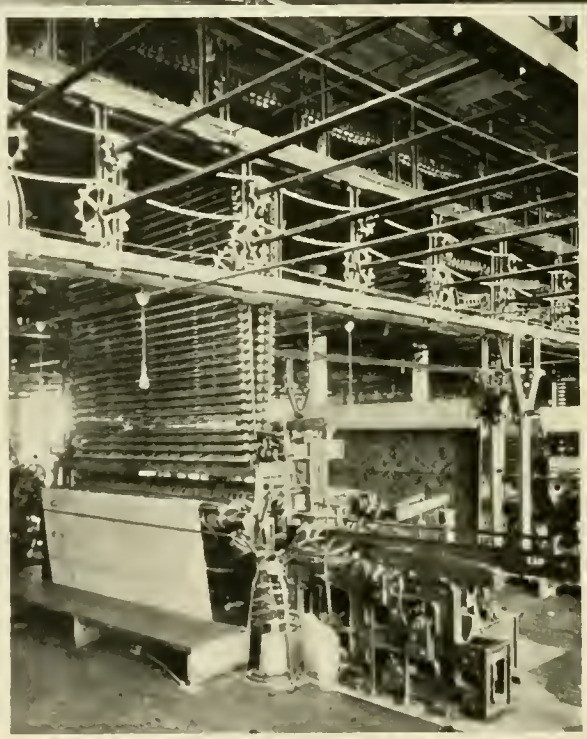
FRONT OF JACQUARD LOOM

showing the rug as it is being woven. Above, laced together, are the perforated cards governing the Jacquard mechanism.



A row of 9 ft. Axminster Looms in the Bigelow-Hartford plant at Clinton, Mass.

The tufting yarns are carried on spools attached to the endless chain above the loom. Row by row they are brought to the proper position, the yarn inserted in the fabric, cut off, and bound down—a remarkable mechanical performance.



An Axminster loom viewed from the side, showing clearly the tufting yarns as they move downward to form their separate rows in the carpet.

others to form the pattern. The device which controls this—the Jacquard—is a sort of slatted chain of "cards." These can be seen in the photograph opposite page 74, draped over the upper part of the loom.

Each card is perforated with a great many holes. The position of these holes on the cards governs the position and color of every tuft of wool that is to appear in the pattern. When the holes are all cut, the cards are laced together to form the chain, which much resembles the music roll of a player-piano and, in fact, has much the same function. When these cards are placed in position at the top of the loom, long needles come against them, and, by passing through the holes, or by being stopped by the blank spaces, operate a mechanism which raises some of the strands of colored wool above the others. The strands that are raised form the pattern on the surface of the rug.

When the strands that are to show in the surface in a single row across the rug are raised, the wire, just the height of the pile, is inserted between these and the lower strands. Then the upper strands are dropped behind the wire, and the shuttle throws across them a binder thread which holds them in a tight loop over the wire.

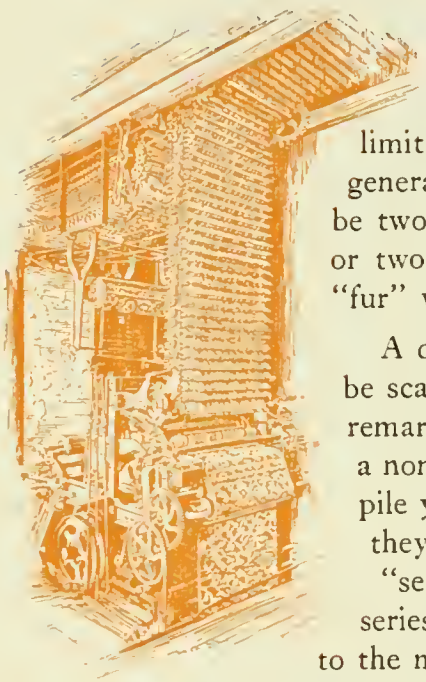
In weaving, a number of wires are used, one behind the other, each covered by loops of yarn that later are going to form the pile of the fabric. As the wire is withdrawn in a Wilton carpet or rug it cuts the loops; in a Brussels it leaves them intact.

Axminsters

From the standpoint of time, Axminsters may be called a comparatively recent development in the carpet industry. Yet in appearance they perhaps resemble more closely than all other modern machine-made carpets the original Oriental fabrics. This resemblance arises primarily out of the almost unlimited number of colors which may be introduced into an Axminster design, and secondarily out of the tufted character of the pile. In the Oriental carpets, of course, the tufts are inserted and knotted by hand. In the Axmin-

ster, the tufts are inserted in the fabric by machine, and bound down without being knotted.

To explain the Axminster weave in a word, the tufts are inserted row by row between the warp threads, either before or after being cut off (depending upon the specific type of loom), and are then bound down by the weft and woven into the ground of the texture. Each tuft is used on the surface to form part of the design. Unlike the Wilton and Brussels carpets described above, there is in the Axminster none of the tuft material hidden from view in the body of the fabric except what is needed for attachment to the binding weft.



There are several varieties of Axminster, each revealing slight differences in respect to the base structure, method of binding, and length and fineness of the pile; but the fundamental principle remains the same as regards the formation of tufts, possibilities, and limitations of design and color, together with their general appearance. In these several varieties there may be two or three warps for the base and stuffing and one or two wefts for filling and binding, in addition to the "fur" which is interwoven and displayed on the surface.

A detailed description of the Axminster loom would be scarcely practicable here, for the device is indeed a remarkable piece of mechanism and too complicated for a non-technical discussion. Suffice it to say that the pile yarns are arranged so as to form the design before they are put on the looms. The operation is called "setting," and consists of winding the yarn onto a series of wide spools, the number of which corresponds to the number of rows of tufts in one complete repeat of the design to be woven, while each spool contains as many ends of yarn as there are squares in the width of the design.

Next the ends of yarn on these spools are threaded through a series of tiny metallic tubes, and these tubes and spools are subsequently attached to the tufting carriage, ready to be set up in order

in the loom for weaving. The tufting carriages are then placed, in the correct rotation to form the pattern, upon endless chains. The driving mechanism of the loom produces a sort of intermittent motion so that, when each spool is in position to make its row of tufts, the chains remain at rest long enough for the spool to be removed from them, lowered for the tubes to enter the warp threads, the tufts to be cut off, and the spool to be replaced on the chains.

Variations from the spool and tube method of inserting tufts into the Axminster weave have been devised, one of the most satisfactory of which is a combination of yarn carriers operated by a Jacquard with a differential lift mechanism for selecting the colors. This principle is being applied with exceptional success to looms for weaving wide seamless Axminsters.

Bradbury, an English authority on rugs and carpets, says of Axminsters, "Generally speaking they are far superior to Eastern and hand-made productions, and where the price is permitted to enter as a factor, they leave these primitive structures still further in the rear." And R. S. Brinton remarks on that statement that "there can be no difference of opinion as regards the general merits of the fabric. It combines economy in the use of material and in manufacture with richness of texture and almost unlimited potentialities of design and color effect."

Tapestry and Velvet

Tapestry is a loop-pile fabric resembling Brussels, with a worsted yarn surface. Unlike Brussels, Wilton, or Axminster, however, it is not a "yarn dyed" product. The undyed yarn is wound on a large cylinder, or drum, and the design is then *printed* on the threads in the various colors to form the pattern, before weaving. As each thread is printed with all the colors, all the yarn is used on the surface and none is carried through the back as in Brussels and Wilton rugs. While the appearance of Tapestry is similar to that of body Brussels, yet the design is not so sharply represented, and the characteristic Brussels body is lacking, the figuring threads being all on the surface.

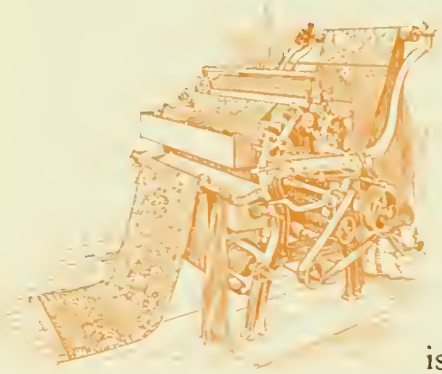
Velvet, or Tapestry Velvet, is made of either wool or worsted yarn and bears the same relation to Tapestry that Wilton bears to Brussels. It is dyed in the same way and woven in much the same manner, but the loops are cut as the wires are drawn, giving it a tufted surface.

Shearing and Finishing

The concluding processes in the manufacture of carpets and rugs, following the weaving, depend upon the type of fabric.

Loop-pile goods, such as Brussels or Tapestry, come from the looms with their surface smoothly ribbed, and practically ready for use. Minor details of binding the edges and sewing together the strips (when the fabrics have been woven on narrow looms) to construct room-size rugs are about all that remain to be cared for before the goods are finally inspected and rolled for shipment.

But cut-pile fabrics such as Wiltons, Axminsters, and Velvets, are far from complete as they issue from the looms. In Wilton and Velvet grades where the original loops have been slit by the wires, a rough, fuzzy edge is left as each wire is withdrawn. In Axminsters the tufts present a slight irregularity in length, and must be made even.



To effect the required surface smoothness, cut-pile fabrics are passed through a shearing machine directly after the weaving. This machine carefully brushes the pile upwards, and then passes the fabric under a roller, formed into a spiral knife, which rapidly rotates over the surface of the pile, shearing off the ends of the tufts evenly. The process is very similar to that of gently raking up tramped-down grass and then running over it with a lawn mower.

Following this first clip, the fabrics are steamed to bring out the fullness of the pile. After the steaming, the goods are sheared again one or more times, depending on their character and the height of pile desired.

At each operation since weaving, the fabrics have been inspected; but after the last shearing they are subjected to a final rigid examination to detect even the slightest imperfection.

People talk a great deal about "machine-like regularity," but there is nothing more irregular than a machine that is not watched. It will go through all the motions of weaving a carpet whether the threads are there or not. And weavers are human beings, subject to the failings that "the flesh is heir to." Mistakes do sometimes creep in, in spite of the most careful watching, and it is to detect these little flaws and to prevent an unworthy carpet or rug from going into the world trade-marked "Bigelow" or "Hartford" that each is submitted to these three or more inspections.

It remains simply to roll the rug fabrics on bamboo poles, wrap, and label them for shipment to their destination. Rolls of carpet are baled or boxed for shipment.

Significant care for detail is to be found in every branch and every process of the carpet industry at Clinton and Thompsonville. It is this combination of labor-saving devices and superior materials and workmanship that increases the beauty and durability of Bigelow-Hartford fabrics and enables this century-old organization to offer to the world, not as a rarity but as an everyday necessity, rugs and carpets of the greatest beauty and durability. Here abides the true American standard, the honest descendent of that democratic gesture of Erastus B. Bigelow.

Chapter Eight

THROUGH ONE HUNDRED YEARS

A CENTURY has passed and it is now 1925, the end of the first quarter of the 20th century, an era of electricity, psychic research, and utilized air waves; of transcontinental airships, telephonic photographs, and stupendous industrial production. More things are done in the world than ever before, and a greater speed has been attained in every phase of life than was even dreamed of in the past.

America has cradled a high-geared race, incapable of going slowly, and not given to prolonged reflection. The past hundred years are gone, and the average man shudders at the thought of invading a dead world peopled with historical ghosts. New customs, new people, new industries, have grown up and are absorbed in their own interests. "Progress, not History" is the slogan of the 20th century.

Yet it is possible for us to review these latter hundred years almost at a glance, for there still exist in the older American communities a few venerable and worthy industries which epitomize the difficult and humble beginnings, the ambitious dreams of adolescence, and the generous fulfillment of maturity—the three fundamental stages in the progress of those concerns that have survived.

The Bigelow-Hartford Carpet Company is one of these centenarians which has grown with the years and learned wisdom with the years.

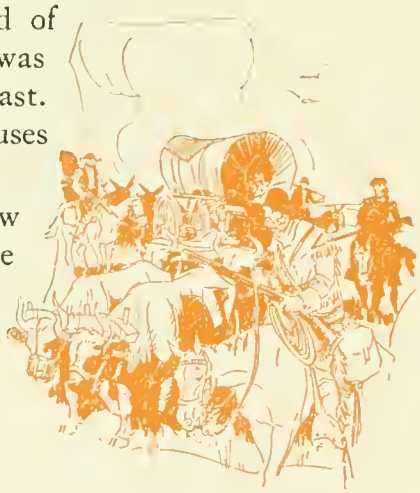
Ever since 1825 this great institution has moved forward, steadily, progressively, healthily—discarding the old when it was outworn, absorbing the new when it had proven its worth.

One hundred years of American history, one hundred years of American industry, have passed beneath the eyes of this Company. Twenty-five Presidents of the United States have been elected and have served their terms, brief or extended as the fates have decreed. War clouds have gathered, loosed their thunders, exacted their toll, and dispersed: the Mexican War, the Civil War, the Spanish War, and finally that war of wars—The Great War—whose wounds we are even to-day attempting valiantly, but not too effectively, to heal.

And through it all, through the changing fortunes of war and peace, through the eras of national prosperity and national adversity, the Bigelow-Hartford Carpet Company and its ancestry have stood unshaken, calm with the patience of age and unworried with the assurance of youth.

In 1825 the carpet industry was purely experimental; carpets were hand-made luxuries, and any attempt to manufacture them mechanically must naturally have been experimental. Only a hundred years pass, and the finest of carpets and rugs are standard articles of necessity in practically every house. In 1825 the wool industry was young, uncertain; sheep were few and wool-raising a new practice. Weaving was done at home by the women, who had not yet entered the field of business. The carpeted room was locked to the children, to be thrown open to the admiring neighbors and relatives only for such momentous functions as weddings and funerals.

But invention, discovery, and exploration entered this new, under-populated country, bringing about great changes. Industry grew, the South became agricultural, the North a manufacturing land. Later the West was explored, and its hoard of metals, minerals, agricultural crops, and live stock was not long in finding its way to the markets of the East. Banks sprang up, failed or flourished. Business houses began to have a "tradition" and a "past."



Inventors like Erastus B. Bigelow offered new opportunities to the manufacturers, the tradesmen, the financiers, the people. The population increased; the demand for articles of every sort became

greater; new inventions were patented; and manufacturers doubled and tripled their production in a few years. In a century the United States changed from a country of great potentialities to a country of even greater actualities.

Home life changed, industrial life changed, public life changed. The "parlor" was opened to the family, and the carpets of the "Bigelow," the "Lowell," and the "Hartford" mills were installed in all the rooms of the house. Later the carpets were taken up, and together with the whatnot and the antimacassars, the plush albums, and the gilded rolling-pins, were stored away in the attic. Art and decoration had reached America. Smooth floors, covered and adorned with artistically designed rugs, subdued color tones, and well-proportioned furniture are now a part of every tasteful home.

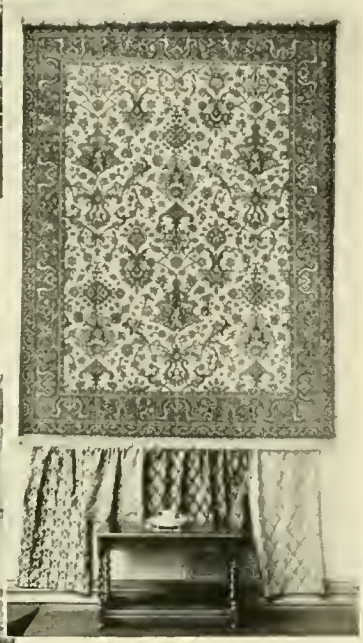
In 1850 Jenny Lind came to America. Newspaper accounts of that day report that the "Swedish Nightingale" took the country by storm as she stood on the stage with hands folded, the sputtering gaslights sending gray shadows wavering over her white crinoline, the magic of her voice making musical tradition that will live for all time. The building rocked, swayed, at the applause; the exposed but gilded rafters delivered fine showers of collected dust upon the enthusiastic audience; and the thin floors creaked beneath the strain of stamping feet.

In 1924 Eleanora Duse paid a farewell visit to America. The enthusiasm was as prolonged—the charm and personal beauty of the great emotional actress, old, weak, but with a beauty that shone through any unkind fingering of time, was as striking—as that of the immortal Lind. But the theatre would present a strange contrast to that of 1850. Gone are the sputtering gaslights; gone are the naked rafters, the flimsy boxes; gone are the unsubstantial decorations and the uncarpeted, or at best, poorly carpeted, floors. The buildings to-day are strong, safe, spacious, and fireproof. The decorations are expensive, but in quiet good taste. And on the floors of the greatest of modern playhouses are thick, velvety carpets, some of the finest products of Bigelow-Hartford looms.

Left

HOTEL
PENNSYLVANIA,
NEW YORK

Bigelow Austrian Tufted rugs help to make the lobby of Hotel Pennsylvania one of the most magnificent in New York City.



Right

METROPOLITAN MUSEUM OF ART

This Bigelow Imperial Ispahan rug was photographed as it appeared on exhibition at the Metropolitan Museum of Art, New York City, 1924—a representative product of America's industrial arts.

Above

LOS ANGELES
BILTMORE HOTEL

The management of the Los Angeles Biltmore Hotel selected Bigelow Austrian Tufted rugs as most appropriate for this palatial lobby.

Right

HOTEL SENATOR,
SACRAMENTO

Hartford-Saxony rugs contribute richly to the luxuriance of the lobby of Hotel Senator, Sacramento, Cal.

Left

CAPITOL THEATRE, NEW YORK

That Bigelow Imperial Axminster carpet was chosen to cover and adorn the floors of the beautiful Capitol Theatre, New York City, is a high tribute to this representative product of the Bigelow-Hartford looms.

Right

HOTEL TRAYMORE, ATLANTIC CITY

The dining-room of the famous Hotel Traymore, Atlantic City, is carpeted appropriately with Bigelow Imperial Axminster.

Left

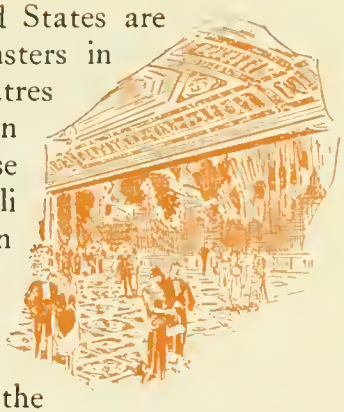
HOTEL STATLER, BUFFALO

This glimpse of a section of the main dining-room, Hotel Statler, Buffalo, reveals one of the notable triumphs of the modern hotel architect and decorator. The final touch was the Bigelow Imperial Sandringham Axminster carpet.

Right

WADE PARK MANOR, CLEVELAND

Simple, unostentatious luxury is the keynote in the design and appointments of the dining-room of Wade Park Manor, Cleveland. The floor covering is Bigelow Imperial Sandringham Axminster.



Over two hundred leading theatres in the United States are carpeted with Bigelow-Hartford Wiltons and Axminsters in almost as many different designs and colors. Theatres such as the Capitol, the Music Box, the Metropolitan Opera House, Keith's Hippodrome, and the Playhouse in New York, the Biltmore in Los Angeles, the Tivoli and the Chicago in the city of that name, the Capitol in Detroit, the Eastman in Rochester, and literally scores of others in the principal cities of the country are carpeted with these rich and beautiful floor coverings.

Nearly 9,750,000 people walked in and out over the Bigelow-Lowell Wiltons on the floors of the Chicago Theatre in one and one-half years, and the carpets were at the end of that time in excellent condition. In the Tivoli Theatre in Chicago, 7,280,000 passed over the Bigelow Axminsters in two years.

That this great enduring power, coupled with beauty and adaptability, has been grasped by hotel managers is evident in the fact that the Bowman chain and the Statler chain, embracing such luxurious hotels as the Commodore, the Pennsylvania, the numerous Statlers and Biltmores, are carpeted, many of them exclusively, with Bigelow-Hartford fabrics.

It is a far cry from hostelries like the old Clinton House in New York, which so favorably impressed the youthful Bigelow, to the gigantic, perfected hotels of to-day. Yet the world has not jumped suddenly into an era of comfort; it has developed that element gradually as a merchandise. Last year's comfort is this year's annoyance, and both the luxuries and the necessities of the world change day by day. But the Bigelow-Hartford rugs and carpets have proved themselves practically changeless. Their popularity, like their high quality, seems almost eternal. In many of America's best known hotels to-day can be seen "Bigelow" or "Hartford" carpets that were placed there over twenty-five years ago, still giving grateful daily service, and revealing slight evidence of the quarter-century that has passed since they left the looms of the makers.

In over one thousand hotels in the United States, hotels from Maine to Florida, New York to California, Bigelow-Hartford carpets and rugs are the floor coverings that give atmosphere and lasting beauty.

Seventy-five New York hotels, including the Astor, the Waldorf-Astoria, the Plaza, the McAlpin, the Vanderbilt, and the Martha Washington, are carpeted with Bigelow-Hartford fabrics. The list of Chicago hotels using Bigelow-Hartford rugs and carpets numbers sixty-six, and includes such well-known names as the Blackstone, the Morrison, the Lake Shore Drive, the Sherman, the Congress, and the La Salle. In Detroit, thirty-one hotels, including the Statler and the Book-Cadillac, have adopted Bigelow-Hartford floor coverings. In San Francisco, Bigelow-Hartford carpets and rugs are used in eighteen hotels, including the Palace, the St. Francis, and the Californian. Thirteen Los Angeles hotels, including the Los Angeles-Biltmore, the Rosslyn, the Ambassador, and the Alexandria, are users of Bigelow-Hartford fabrics.

In Philadelphia one finds Bigelow-Hartford carpets and rugs in fourteen hotels, including the Bellevue-Stratford, the Ritz Carlton, the Adelphia, and the Benjamin Franklin; in Atlantic City, twenty-nine, including the Traymore and the Marlborough-Blenheim; in Washington, D. C., sixteen, including the New Willard and the Lafayette. Thus the list might go on almost indefinitely, from state to state and from city to city. These leading hotels can not afford, either from the æsthetic or the service standpoint, to cover their floors with less than the best. The selection of Bigelow-Hartford goods, particularly for the lobbies, corridors, and other public rooms where the traffic is greatest and appointments the most luxurious, is a tribute of which we feel we may be pardonably proud.

It was in 1760 that the progressive New York store mentioned heretofore advertised "Scot's Carpets" along with handkerchiefs, shoes, barley, herrings, and wine. To-day there is hardly a city in the United States that does not support at least one department store.

and in the larger cities there are sometimes a score or more. Add to these the large specialty stores, the numerous studios, shops, and emporiums all over the country. Select those of the largest size and of the highest quality, and some idea may be gained of the many stores in every state that use Bigelow-Hartford rugs and carpets. It is such stores as Altman's, Arnold Constable, Gimbel Brothers, Lord & Taylor, Saks, Franklin Simon, Wanamaker, and the Tiffany Studios, in New York City; Marshall Field's and Mandel Brothers in Chicago; Filene's in Boston; Bullock's in Los Angeles; and Livingston's in San Francisco, stores of the highest caliber, catering to the wants of thousands every day, that select Bigelow-Hartford carpets for their floors. Four hundred and twelve large stores, many of which are themselves dealers in all makes and varieties of domestic and imported floor coverings, are carpeted throughout with Bigelow-Hartford products.

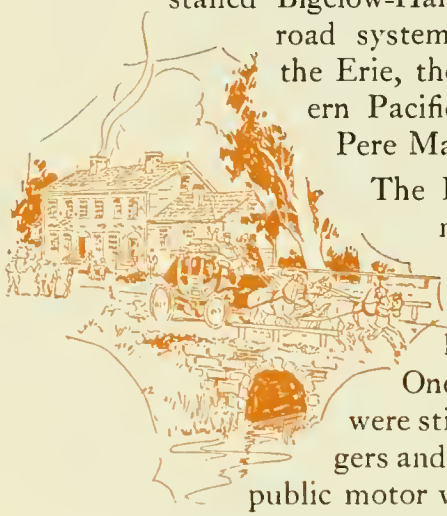
Clubs of every sort, from coast to coast, are furnished with rugs from the Bigelow-Hartford mills,—lodges of the Masons and the Elks, business men's clubs, business women's clubs, art clubs, luncheon clubs, exclusive private clubs, and country clubs. These fabrics are ideal for buildings of this semi-public nature, for they offer durability, permanency, and the soft beauty that gives a homelike atmosphere.

The Bigelow-Hartford Carpet Company manufactures many thousand yards of carpet each year for the steamers of the United Fruit Line, the Clyde Line, the New England S. S. Company, the Eastern S. S. Company, and the Hudson River Day Line. The President Grant, President Johnson, and President Jefferson of the U. S. Shipping Board are similarly carpeted, and the S. S. Leviathan alone carries 10,825 yards of Wilton carpets made by Bigelow-Hartford.

When Alexander Wright watched the first successful run of a locomotive, when crowds on lower Fifth Avenue marveled at the horseless carriage, the wildest dreams of the "fanatics" of those days could not have pictured America as the land of travelers that it now is. Hundreds start from one coast to the other every day. A thousand miles is not far; a hundred miles means only a few hours on a train or in an automobile. Distance has been yoked; miles have

shrunk under the modern transportation system. Travel no longer brings on stiff legs and cramped backs, or fainting fits from fear. Comfort was long ago embodied in trains and autos, and beauty followed close in its wake.

The managers of forty of America's railroad systems have installed Bigelow-Hartford carpets in their cars. Among these railroad systems are such well-known lines as the B. & O., the Erie, the Atlantic Coast Line, the Southern, the Northern Pacific, the Great Northern, the Santa Fé, and the Pere Marquette.



The Pullman Company has used considerably over a million yards of Bigelow-Hartford Wilton in one pattern alone during the last ten years, as well as hundreds of thousands of yards of other patterns.

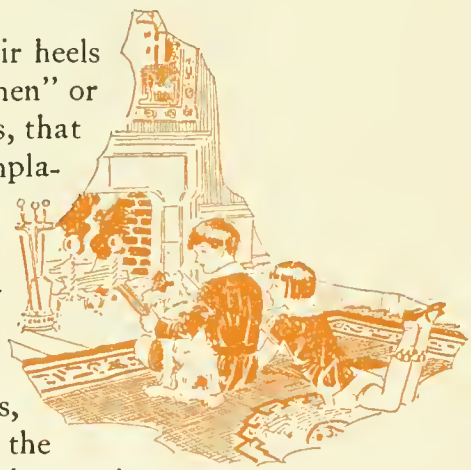
One hundred years ago picturesque stage coaches were still lumbering over the post roads, carrying passengers and mail. To-day luxurious private automobiles and public motor vehicles glide swiftly over the same highways—a remarkable span in the travel facilities and travel habits of a people. But the older vehicles and the modern had at least one thing in common, i. e., the carpets on the floor, that final appointment which has made the coach, surrey, cab, and automobile something more than simply a means of transportation. Throughout the century the looms of this Company and its parent concerns have supplied a generous share of the carpets utilized in coach and carriage work; to-day Bigelow-Hartford carpets are the standard of excellence among the makers of fine automobiles the country over.

America has been called, and justly so, a "nation of homes." Search the world over and you will find no other land where the people of all classes are so comfortably housed. To be sure, the countries of the Old World have their palaces, their estates, their chateaux,—all interesting to see, but in no sense "homes" as we understand the term. Furthermore, their occupancy in earlier times and ours has always been confined to the upper, richer classes. In America, too, one can find thousands of mansions here and there which are sump-

tuous in every detail; but these, again, are not called to mind by the mention of the term "home." Rather we think of those more modest dwellings of the people at large—street upon street of them in our metropolitan districts, lane upon lane in the villages and rural sections—houses with inviting, well-kept dooryards, borders of colorful flowers, trees, shrubs—and contentment.

The American home is more than the dirt-floored shelter of Southern Italy, the chill, barren tenement of London, or the cramped flat of Paris. It is more than a place of existence. It is a place for living, for the attainment of high ideals. In it resides the best that the nation is.

In this typical American home our children receive their first impressions of life; and their first tours on hands and knees are over the soft, warm carpets which are one of the necessary and fundamental furnishings of every house that is to become a home. On the carpets are spread the bright-colored balls and indestructible toys of very early childhood, to be supplanted by the blocks and tin soldiers, and the walking-and-talking dolls of "going-on-six."



Beside the fire, lying on their stomachs, with their heels up and kicking, the ten-year-olds read "Little Women" or "The Rover Boys." And the beginning of the teens, that difficult period of dark reflection and moody contemplation, finds the young people staring in silence at the pattern of the rug, tracing its design over and over again, while they ponder on the injustice of the world and plan the revolt of youth!

Snatches of early childhood can be recalled by almost every man or woman. Disjointed scenes, bits of conversation, almost forgotten details of the "house where I was born," drift surprisingly into one's consciousness from some strange source in the back of one's mind. And how often a rug or carpet figures in these memories!

Many unaccountable likes and dislikes could probably be traced to the formative period of childhood, and reaction to early environment. A man will say: "I don't know why, but I've *always* been

fond of red." Perhaps a red carpet was his playground, his battlefield, his ocean, when he was a child.

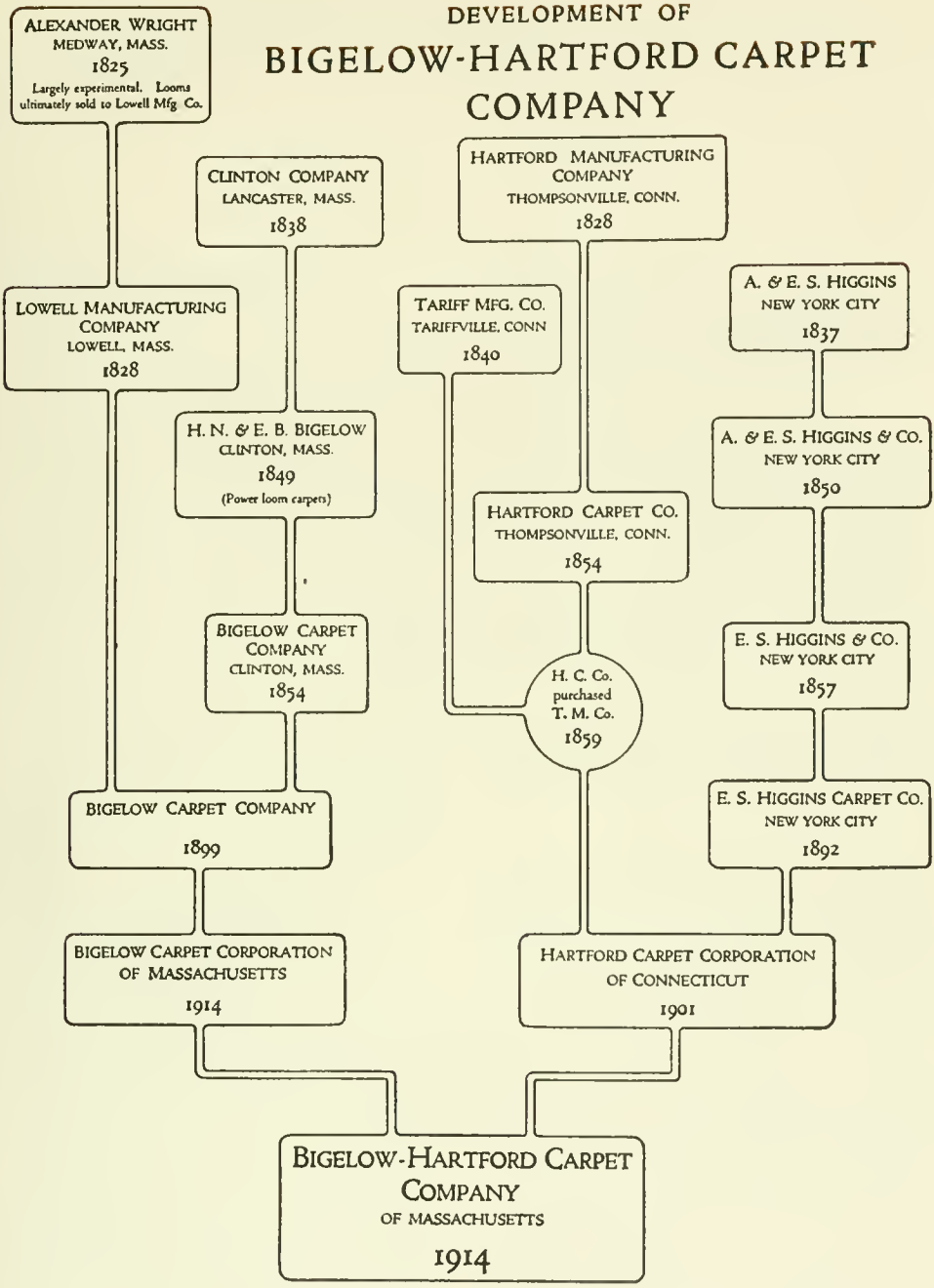
Think, then, of the influence of Bigelow-Hartford rugs and carpets upon the entire nation throughout the last hundred years! Their quality has been of the highest; their enduring power of the greatest. The beauty of their designs, the rare loveliness of their colors, the high standard of their materials, all have made them ideally suited for the American home.

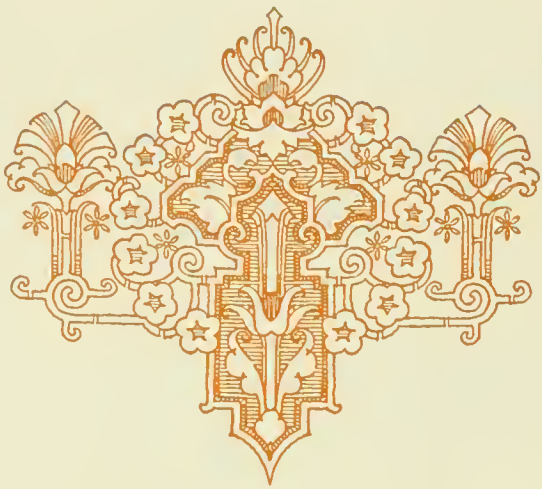
The Bigelow-Hartford Carpet Company is proud of its history, of its full century of participation in the business of carpet and rug making in America. It values beyond price the traditions and memories that have been passed down from its pioneer founders, and from its middle generations of faithful craftsmen and able business executives who brought those earlier ideas and ideals to wholesome fruition.

It prizes more than words can express the far-reaching trade associations that have been developed, and which have become more and more intimate and pleasant as the years have progressed. The wholesale and retail dealers throughout the country have always accorded this Company the good will and loyalty which are any manufacturer's greatest inspiration to excel.

But most gratifying to us of all the evidences of our century of industrial activity is the fact that we have been able to contribute in a tangible way to the comfort and beauty and individuality of the American home, for thus we have been privileged to make a material contribution to American life itself.

DEVELOPMENT OF BIGELOW-HARTFORD CARPET COMPANY





CARPET TERMS

Briefly Explained *for the* Layman

Aberdeen. (1) A city in Scotland.
(2) A three-shot worsted plain Wilton carpet made by the Bigelow-Hartford Carpet Co. (See Wilton)

Ardebil. (1) A famous Oriental rug from the Mosque of Ardebil, now in the Victoria and Albert Museum, London, England.
(2) Imperial Ardebil is a type of worsted Wilton rug manufactured by the Bigelow-Hartford Carpet Co. (See Wilton)

Ardehan, Royal. One of the Bigelow-Hartford worsted Wilton rugs. (Ardehan, or Ardahan, is a Trans-Caucasian town, now a part of Russia).

Art Square. An Ingrain carpet woven in one piece.

Asian, Bigelow. A high grade Bigelow-Hartford Wilton manufactured in plain carpets only.

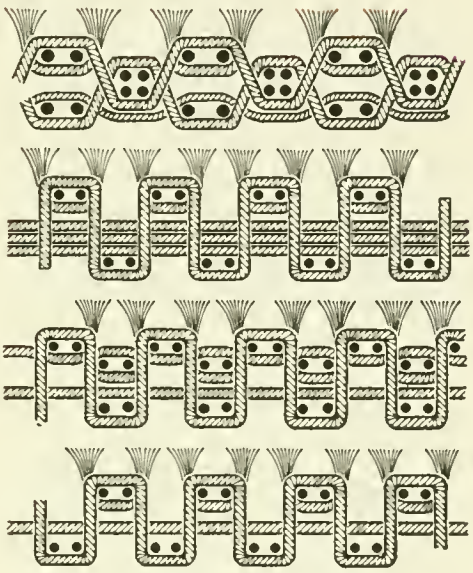
Astoria. A Bigelow-Hartford high-pile, very closely woven Axminster carpet, figured and plain.

Aubusson. A French carpet made on a tapestry hand loom. The warp is cotton and the weft consists of woolen yarns of the colors called for by the design. The weft yarns are inserted in the warp by hand, the weaver using a small bobbin, or broach, similar to that which is employed for Gobelin Tapestries.

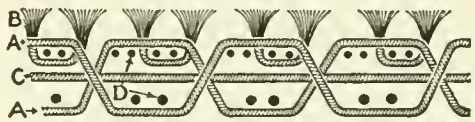
Austrian, Bigelow. A very high pile Wilton of wool yarn, made by the Bigelow-Hartford Carpet Co. in rugs and carpets.

Axminster. (1) A town in England.
(2) A hand-made carpet having a warp of linen threads, with a pile of woolen tufts tied in by hand in Oriental fashion.
(3) A carpet with a linen, cotton, or jute warp and a chenille weft.
(4) A type of machine-made fabric described on page 75. In Axminster, fifteen grades of rugs and plain and figured carpets are made by the Bigelow-Hartford Carpet Co.
(5) Bigelow Axminster. A specific grade of Axminster carpet of high quality, made at the Clinton, Mass., plant of the Bigelow-Hartford Carpet Co.

Section of Axminster Weave



Sections of Axminster Weaves



Section of Imperial Axminster. 3-Shot

(A) Chain; (B) Tufts; (C) Stuffer warp; (D) Double Weft

Bangor, Imperial. A Bigelow-Hartford wool Wilton rug. (See Wilton)

Batten, Lay, or Comb. A swinging bar which beats up the weft yarns in the operation of weaving.

Beam. A large horizontal roller or spool, on which the warp or the woven fabric is wound.

Beating Up. Forcing close together the weft yarns in weaving.

Belgrade. A Bigelow-Hartford Broadloom plain carpet.

Belmore. A Bigelow-Hartford Velvet made in plain carpets.

Berkshire. A seamless Tapestry rug made by the Bigelow-Hartford Carpet Co. (See Tapestry)

Bobbin. (1) A spool carried by the shuttle, on which the weft or filling is wound.
(2) Creel bobbins; spools carried on the frame of a Jacquard loom, on which the yarn is wound.

Body Brussels. (See Brussels, 2). Name originates out of the fact that Brussels has an unusually durable and resilient body, because of the worsted yarn woven into it.

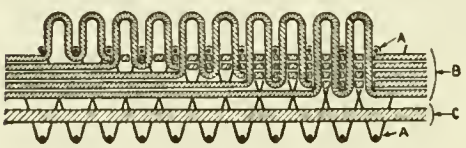
Branford. A Bigelow-Hartford plain, high pile, wool Velvet carpet.

Bretton. A Bigelow-Hartford plain Velvet carpet.

Brewster, Imperial. A Bigelow-Hartford Broadloom carpet manufactured in plain colors only.

Brunswick. A Bigelow-Hartford wool yarn figured Wilton carpet.

Brussels. (1) The capital city of Belgium.
(2) A Jacquard carpet having cotton or linen chain, a linen filling, and a warp of colored worsted yarn, which in the weaving is raised by the Jacquard machine into loops to form the pattern.
(3) Fabrics manufactured by the Bigelow-Hartford Carpet Co. in one grade of rugs and one grade of carpets.



Section of Five-Frame Brussels Carpet
(*A A*) Chain; (*B*) Pile warp; (*C*) Stuffer warp

Brussels, Stouts. A Brussels carpet having only 208 or 216 ends of worsted warp to each frame instead of 256 ends, as in regular five-frame Brussels. In weaving Stouts, jute yarn is used to replace the worsted yarns omitted and also to give body to the fabric.

Burbury. A Bigelow-Hartford figured Wilton carpet made of worsted yarn. (See Wilton)

Burwin. A grade of Axminster made in rugs and carpets by the Bigelow-Hartford Carpet Co.

Bussorah. A Bigelow-Hartford Axminster made in rugs and carpets.

Bussorah, Imperial. A Bigelow-Hartford seamless Axminster rug.

Carding. Subjecting wool to the action of cylinders or drums covered with wire-toothed cards, revolving nearly in contact, at different rates of speed, or in opposite directions.

Chain. The warp threads of a fabric, which, in combination with the weft, form the woven base of a fabric.

Chenille. A carpet with a weft of chenille fur, long strips of woolen cloth, cut from a piece into horizontal stripes; it is seamless, has the absolute minimum of wool, and is unlimited in color.

Clinton. (1) A town in Massachusetts, the scene of Erastus B. Bigelow's power-weaving experiments.
(2) A type of Bigelow-Hartford worsted Body Brussels rug. (See Brussels)

Cloth Beam. The bar on which a fabric is wound after it is woven on the loom.

Color, Complementary. One or two colors which when combined, produce white or nearly white light,—as orange and blue.

Color, Primary. (1) The principal colors into which white light is separated by a prism.
(2) Those colors which when mixed (in pigments) produce any color,—red, blue, yellow.

Colorist. In carpet making, one who selects the colors and shades of yarn which are to constitute the pattern and match the artist's design.

Comb (in weaving). (See Batten)

Combing (for spinning). The process of separating by a machine called a "comber" the longer fibres from the shorter.

Commodore. A Bigelow-Hartford figured Wilton carpet, made of worsted yarn. (See Wilton)

Construction. A specification applied to rugs. For example, a rug 12 ft. x 15ft., *4/4 construction*, means a rug the strips of which are woven on a 4/4 loom. There would be four strips, each 36 inches wide and 15 feet long. After weaving, the strips would be sewed together.

Cop. A conical roll of thread or yarn found on the spindle of a spinning wheel.

Cop Tube. The tube on which the thread or yarn is wound.

Drawing. The process of pulling out and elongating the slivers from the carding machine by pairs of revolving rollers of successively increasing speed; also the slivers thus drawn out.

Drop Box. A box used in a pattern-weaving loom to hold a number of shuttles, any one of which may be brought into operation as desired.

Electra, Bigelow Imperial. A seamless, all-wool Axminster rug made by the Bigelow-Hartford Carpet Co.

Faller. A cylinder studded with steel pins operating in the gilling machine to lay the woolen fibres parallel.

Felting. A natural clinging or matting together of woolen fibres.

Figuring Threads. The threads of yarn which are revealed on the surface of a carpet to form the pattern.

Filling, Weft, Woof. The threads or yarns thrown by the shuttle through the warp from selvedge to selvedge.

Filling Mill. The mill in which wool yarn is spun.

Frame. A rack attached to the Jacquard carpet loom, and holding the spools of wool or worsted figuring yarn. Three to six of these racks are used, according to the character of the fabric being woven.

Gill Box. The machine in which gilling takes place.

Gilling. The process, in making worsted, of dividing wool fibres into parallel filaments by means of closely ranged steel pins.

Gobelin. (1) The elaborate Tapestry woven at the Gobelins for French governmental gifts. It is never sold now.
(2) Gobelin blue—a greenish blue mixed with gray.

Gobelins, Les. French national Tapestry works founded 1662 at Paris.

Granite. An all-cotton fabric, an adaptation of the damask weave, the pattern being formed by the warp instead of the filling.

Grenoble. (1) A city in France.
(2) A high pile wool Axminster made in seamless rugs and plain carpets by the Bigelow-Hartford Carpet Co.

Harness. An apparatus used for lifting threads in a loom.

Harness Frame. An upright board for guiding the cords of a loom harness.

Harness Shaft. A device for holding or guiding the heddles in a loom.

Hartford-Saxony. A superior type of Wilton fabric. Manufactured in numerous patterns and designs in rugs and figured or plain carpets by the Bigelow-Hartford Carpet Co. Very high wool pile.

Heck. A vertical grated frame, through the meshes of which the warp threads pass.

Heddle or Heald. A series of vertical cords or wires, each of which has in the middle a loop or eye which receives a warp thread. The heddles pass around and between parallel bars, forming part of the harness, and by rising and falling alternately cross the warp threads and form sheds for the passage of the shuttle.

Hemp Carpet. A fabric made with a jute warp and filling in two or more plies.

Imperial, Bigelow. A type of Axminster carpet of extremely fine quality, made by the Bigelow-Hartford Carpet Co.

Ingrain. A carpet made in two or three plies, the warp being worsted or cotton, with a wool filling.

Ispahan. (1) An Oriental rug, the product of the village of Saruk in the Feraghan district of Persia.
(2) One of the finest quality modern worsted Wilton rugs. It is manufactured by the Bigelow-Hartford Carpet Co.

Jacquard. An apparatus used for weaving figured patterns. It consists of a chain of perforated cards which move over a rotating prism. The perforations permit the passage of wires which determine by their movements the raising of the warp threads, and thus cause the figure to be woven in accordance with the arrangement of the perforations. Invented by Joseph Marie Jacquard of Lyons, France, in 1800.

Jute, Ingrain. A carpet made like an Ingrain, but with a cotton warp and jute filling.

Kidderminster. (1) A municipal borough of Worcestershire, England.
(2) An Ingrain carpet, so called because first manufactured largely at Kidderminster, England.

Lancaster, Bigelow. A wool yarn Wilton manufactured by the Bigelow-Hartford Carpet Co. in figured carpets only.

Lay. (See Batten)

Lofty. Term applied to wool, and meaning full-bodied.

Loom. A machine in which yarn or thread is woven into a fabric by the crossing of the warp or chain by other threads, called the weft or filling.

Lowell. (1) A city of Massachusetts where the Lowell Manufacturing Company was founded.
(2) A Bigelow-Hartford wool Axminster made in figured carpets only.
(3) Bigelow-Lowell, a three-shot worsted Wilton made in plain and figured carpets by the Bigelow-Hartford Carpet Co.
(4) Bigelow-Lowell Body Brussels, a high grade Bigelow-Hartford worsted Brussels in figured carpets only.

Marmon. A wool Axminster rug manufactured by the Bigelow-Hartford Carpet Co.

Merrimac. A figured worsted Wilton carpet made by the Bigelow-Hartford Carpet Co.

Mix. A blend of different types of wool in proper proportions, in order to achieve a yarn of a determined resiliency, luster, strength, and depth.

Moquette. (1) A French pile carpet resembling a Wilton, but made on a hand loom.
(2) An American pile carpet woven on a power loom which forms the pile by fastening tufts of woolen yarn into the warp. Similar to Axminster.

Mule, Mule-jenny, or Jenny. A machine for simultaneously drawing and twisting wool into yarn and winding it into cops.

Natural Gray. Types of plain carpets manufactured by the Bigelow-Hartford Carpet Co. of neutral gray, undyed yarn.

Noils. The short ends of wool separated from the long fibres by combing.

Opener. Machine into which the raw wool is fed after removal from the bale or bag. It pulls apart the matted tufts and beats out the loose dirt.

Pattern Card. The perforated card in a Jacquard, representing part of the pattern.

Pattern Chain. A device for operating the shuttle in pattern weaving.

Pick. (1) The blow that drives the loom shuttle.
(2) A unit of speed measurement of work done by a loom.

Picker. A machine for picking wool to pieces so as to loosen and separate the fibres.

Picker Stick or Staff. A lever used to impart motion to a shuttle.

Pile. The upstanding fibres of a carpet, either cut in the process of weaving, as in a Wilton or Velvet, or left uncut as in a Brussels.

Pitch. Pitch is a descriptive term applying to the fineness of weave, crosswise, of a carpet. It is determined from the number of reeds or reed spaces in the width of the sley (see Batten) on the loom. Thus a pitch of 256 indicates that there were 256 reeds or reed spaces in the standard 27-inch width, or approximately nine to the inch.

Planting. The arrangement of threads of two or more colors, side by side, in the same frame in groups, in accordance with the design.

Ply. A fold of yarn.

Pro-Brussels. A carpet woven on an Ingrain loom, but with both frames bound together. The warp threads are of jute, one-half of them being used for binding the threads and the other half as a stuffer. The pattern is produced entirely by interweaving of the weft, which is wool.

Reed. A part of the loom consisting of two horizontal bars, connected by thin parallel strips between which the warp threads pass. It is used to keep the threads separated from one another, and also to preserve the proper distance between the selvedge threads.

Ritz. A Bigelow-Hartford three-shot wool Velvet plain carpet.

Roving. The operation of forming the rove, or slightly twisted sliver or roll of wool, by means of a machine for the purpose, called a roving-frame.

Sandringham, Imperial. A very high pile wool Axminster figured carpet made by the Bigelow-Hartford Carpet Co. A specially fine quality. (See Axminster)

Saranac. A Bigelow-Hartford seamless Tapestry rug. (See Tapestry)

Savonnerie. (1) A French carpet woven in one piece on a high warp Tapestry loom, the warp being of wool and the weft of worsted threads, which are fastened by a double knot on two threads of the warp.
(2) An American carpet somewhat similar to American Moquette or Axminster, but a little thicker and heavier.

Shade. A gradation of color in respect to luminosity, as a dark *shade* of blue.

Shuttle. A boat-shaped piece of wood which holds the bobbin from which the weft threads or filling unwinds as the shuttle moves to-and-fro across the warp threads.

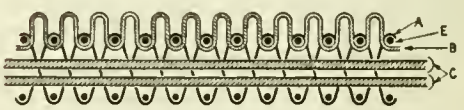
Shuttle Box. (1) A case placed at the end of the shuttle race to receive the shuttle after it has been thrown back by the picker.
(2) One of a series of compartments containing shuttles carrying different colored threads.

Shuttle Race. The track on which the shuttle travels in a loom.

Sliver. A strand or slender roll of wool or other fibre in a loose, untwisted state, produced by a carding or combing machine and ready for the roving which precedes spinning.

Smyrna Carpet or Rug. A chenille Axminster fabric woven with two faces, the wool being on both sides instead of one. In the finished carpet or rug the warp is of cotton thread and the weft chenille, with a thread of jute as filling between each strip of chenille.

Tapestry or Tapestry Brussels. (1) A carpet fabric in which the worsted yarn warp forming the surface is printed in such a manner as to produce a pattern when woven. Tapestry carpets have a linen or cotton weft or binding thread and a jute backing.



Medium Tapestry Carpet
(*A*) Chain; (*B*) Pile warp; (*C*) Stuffer warp; (*E*) Weft

(2) A fabric manufactured in three grades of carpets and rugs by the Bigelow-Hartford Carpet Co.

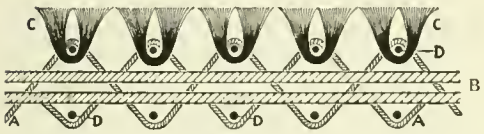
Top. A bunch of fibre; esp., a ball formed of the long combed fibres of wool, ready for spinning into worsted yarn.

Twisting. The process of twining or winding one thread or strand around another, thus giving greater strength to the yarn.

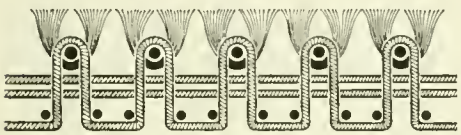
Velvet. (1) A Tapestry carpet in which the loops made by the pattern warp threads are cut, thus forming a velvety surface. Velvet carpets have about 25 per cent. more wool than is used in Tapestry Brussels.

Tapestry Velvet. 3-Shot

(2) A cut-pile fabric manufactured in eight grades of rugs and plain and figured carpets by the Bigelow-Hartford Carpet Co.



Tapestry Velvet
(*A*) Chain; (*B*) Stuffer warp; (*C*) Pile warp; (*D*) Weft



Tapestry Velvet. 2 Shots in the Ground

Venetian. A carpet fabric having a worsted or cotton warp, and a jute filling, the warp being colored and forming the figures.

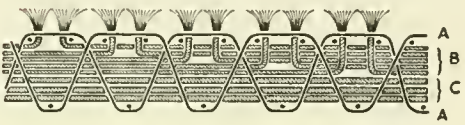
Warp. The threads or yarn running lengthwise in a fabric and between which the cross threads (or weft or filling) are woven.

Warp Beam. The roller on which the warp is wound.

Web. A textile fabric; a name used especially to designate a fabric in the piece or being woven in the loom.

Weft. (See Filling.)

Wilton. (1) A municipal borough of Wiltshire, England.
(2) A Jacquard fabric made like Brussels carpeting, excepting that it has about 50 per cent. more wool, and that the loops on the face are cut so as to form a velvety surface.



Section of Five-Frame Wilton
(*A*) Chain; (*B*) Pile warp; (*C*) Stuffer warp

(3) A type of fabric manufactured by the Bigelow-Hartford Carpet Co. in seventeen grades of rugs and plain and figured carpets.

Winton. A seamless, fringed wool Velvet rug made by the Bigelow-Hartford Carpet Co.

Wire. In Jacquard and Tapestry carpet weaving, the slender metallic rod over which the surface yarn is looped to form the pile.

Woof. (See Filling)

Wool, Dutch. A carpet having a heavy warp and a single thick filling, the warp being woven in so as to form stripes.

Wool Yarn. A yarn spun of long and short fibres which are made to lie in all directions, merging and interlocking, and thus exercising their natural felting properties.

Worsted Yarn. Well-twisted yarn spun of long staple wool which has been combed to lay the fibres parallel.

Tables for yardage of rooms and advantageous cutting of carpet patterns follow on pages 96 and 97.

Rooms of the sizes indicated below will take the quantity of ¾ Carpeting specified, no allowance being made for waste in matching

Size Room	*Breadths*	*Yards*
9 x 9	4	12
9 x 10–6	4	14
9 x 12	4	16
9 x 13–6	4	18
9 x 15	4	20
9 x 16–6	4	22
9 x 18	4	24
10 x 9	4½	13½
10 x 10–6	4½	15½
10 x 12	4½	18
10 x 13–6	4½	20¼
10 x 15	4½	22½
10 x 16–6	4½	24¾
10–6 x 10–6	5	17½
10–6 x 12	5	20
10–6 x 13–6	5	22½
10–6 x 15	5	25
10–6 x 16–6	5	27½
10–6 x 18	5	30
12 x 12	5½	22
12 x 13–6	5½	24¾
12 x 15	5½	27½
12 x 16–6	5½	30¼
12 x 18	5½	33
12 x 19–6	5½	35¾
13–6 x 13–6	6	27
13–6 x 15	6	30
13–6 x 16–6	6	33
13–6 x 18	6	36
13–6 x 19–6	6	39
13–6 x 21	6	42
14 x 14	6½	30⅓
14 x 15	6½	32½
14 x 16	6½	34⅔
14 x 17	6½	37
14 x 18	6½	39
14 x 19	6½	41¼
14 x 20	6½	43⅓
14 x 21	6½	45½
15 x 14	7	32⅔
15 x 15	7	35
15 x 16	7	37⅓
15 x 17	7	39⅔
15 x 18	7	42
15 x 19	7	44⅓
15 x 20	7	46⅔
15 x 21	7	49
15 x 22	7	51⅓
15 x 23	7	53⅔
15 x 24	7	56
16 x 15	7½	37½
16 x 16	7½	40⅔
16 x 17	7½	42½
16 x 18	7½	45
16 x 19	7½	47½
16 x 20	7½	50
16 x 21	7½	52½
16 x 22	7½	55
16 x 23	7½	57½
16 x 24	7½	60
17 x 15	8	40
17 x 16	8	42⅔
17 x 17	8	45⅓
17 x 18	8	48
17 x 19	8	50⅔
17 x 20	8	53⅓
17 x 21	8	56
17 x 22	8	58⅔
17 x 23	8	61⅓
17 x 24	8	64
18 x 15	8	40
18 x 16	8	42⅔
18 x 17	8	45⅓
18 x 18	8	48
18 x 19	8	50⅔
18 x 20	8	53⅓
18 x 21	8	56
18 x 22	8	58⅔
18 x 23	8	61⅓
18 x 24	8	64
19 x 15	8½	42½
19 x 16	8½	45⅓
19 x 17	8½	48¼
19 x 18	8½	51
19 x 19	8½	53⅝
19 x 20	8½	56⅔
19 x 21	8½	59½
19 x 22	8½	62⅕
19 x 23	8½	65⅙
19 x 24	8½	68
20 x 15	9	45
20 x 16	9	48
20 x 17	9	51
20 x 18	9	54
20 x 19	9	57
20 x 20	9	60
20 x 21	9	63
20 x 22	9	66
20 x 23	9	69
20 x 24	9	72
21 x 15	9½	47½
21 x 16	9½	50⅔
21 x 17	9½	53⅝
21 x 18	9½	57
21 x 19	9½	60¼
21 x 20	9½	63⅓
21 x 21	9½	66½

Table showing how Carpet Patterns of certain lengths can be cut to best advantage

	ft. in.	*ft. in.*	*ft. in.*	*ft. in.*	*ft. in.*	*ft. in.*	*ft. in.*	*ft. in.*	*ft. in.*	*ft. in.*
13-inch Pattern cuts at	7–7	8–8	9–9	10–10	11–11	13–0	14–1	15–2	16–3	17–4
14-inch Pattern cuts at	8–2	9–4	10–6	11–8	12–10	14–0	15–2	16–4	17–6	18–8
15-inch Pattern cuts at	10–0	11–3	12–6	13–9	15–0	16–3	17–6	18–9	20–0	21–3
16-inch Pattern cuts at	9–4	10–8	12–0	13–4	14–8	16–0	17–4	18–8	20–0	21–4
17-inch Pattern cuts at	9–11	11–4	12–9	14–2	15–7	17–0	18–5	19–10	21–3	22–8
18-inch Pattern cuts at	9–0	10–6	12–0	13–6	15–0	16–6	18–0	19–6	21–0	22–6
19-inch Pattern cuts at	9–6	11–1	12–8	14–3	15–10	17–5	19–0	20–7	22–2	23–9
20-inch Pattern cuts at	10–0	11–8	13–4	15–0	16–8	18–4	20–0	21–8	23–4	25–0
21-inch Pattern cuts at	10–6	12–3	14–0	15–9	17–6	19–3	21–0	22–9	24–6	26–3
22-inch Pattern cuts at	11–0	12–10	14–8	16–6	18–4	20–2	22–0	23–10	25–8	27–6
23-inch Pattern cuts at	11–6	13–5	15–4	17–3	19–2	21–1	23–0	24–11	26–10	28–9
24-inch Pattern cuts at	10–0	12–0	14–0	16–0	18–0	20–0	22–0	24–0	26–0	28–0
25-inch Pattern cuts at	10–5	12–6	14–7	16–8	18–9	20–10	22–11	25–0	27–1	29–2
26-inch Pattern cuts at	10–10	13–0	15–2	17–4	19–6	21–8	23–10	26–0	28–2	30–4
27-inch Pattern cuts at	11–3	13–6	15–7	18–0	20–3	22–6	24–9	27–0	29–3	31–6
28-inch Pattern cuts at	11–8	14–0	16–4	18–8	21–0	23–4	25–8	28–0	30–4	32–8
29-inch Pattern cuts at	12–1	14–6	16–11	19–4	21–9	24–2	26–7	29–0	31–5	33–10
30-inch Pattern cuts at	10–0	12–6	15–0	17–6	20–0	22–6	25–0	27–6	30–0	32–6
31-inch Pattern cuts at	10–4	12–11	15–6	18–1	20–8	23–3	25–10	28–5	31–0	33–7
32-inch Pattern cuts at	10–8	13–4	16–0	18–8	21–4	24–0	26–8	29–4	32–0	34–8
33-inch Pattern cuts at	11–0	13–9	16–6	19–3	22–0	24–9	27–6	30–3	33–0	35–9
34-inch Pattern cuts at	11–4	14–7	17–0	19–10	22–8	25–6	28–4	31–2	34–0	36–10
35-inch Pattern cuts at	11–8	14–7	17–6	20–5	23–4	26–3	29–2	32–1	35–0	37–11
36-inch Pattern cuts at	9–0	12–0	15–0	18–0	21–0	24–0	27–0	30–0	33–0	36–0
37-inch Pattern cuts at	9–3	12–4	15–5	18–6	21–7	24–8	27–9	30–10	33–11	37–0
38-inch Pattern cuts at	9–6	12–8	15–10	19–0	22–2	25–4	28–6	31–8	34–10	38–0
39-inch Pattern cuts at	9–9	13–0	16–3	19–6	22–9	26–0	29–3	32–6	35–9	39–0
40-inch Pattern cuts at	10–0	13–4	16–8	20–0	23–4	26–8	30–0	33–4	36–8	40–0
41-inch Pattern cuts at	10–3	13–8	17–1	20–6	23–11	27–4	30–9	34–2	37–7	41–0
42-inch Pattern cuts at	10–6	14–0	17–6	21–0	24–6	28–0	31–6	35–0	38–6	42–0
43-inch Pattern cuts at	10–9	14–4	17–11	21–6	25–1	28–8	32–3	35–10	39–5	43–0
44-inch Pattern cuts at	11–0	14–8	18–4	22–0	25–8	29–4	33–0	36–8	40–4	44–0
45-inch Pattern cuts at	11–3	15–0	18–9	22–6	26–3	30–0	33–9	37–6	41–3	45–0

In making your calculations do not figure too closely, as some carpets stretch or shrink a little, or a new piece of the same pattern may occasionally be made half an inch smaller or larger by the manufacturer.

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